Flight

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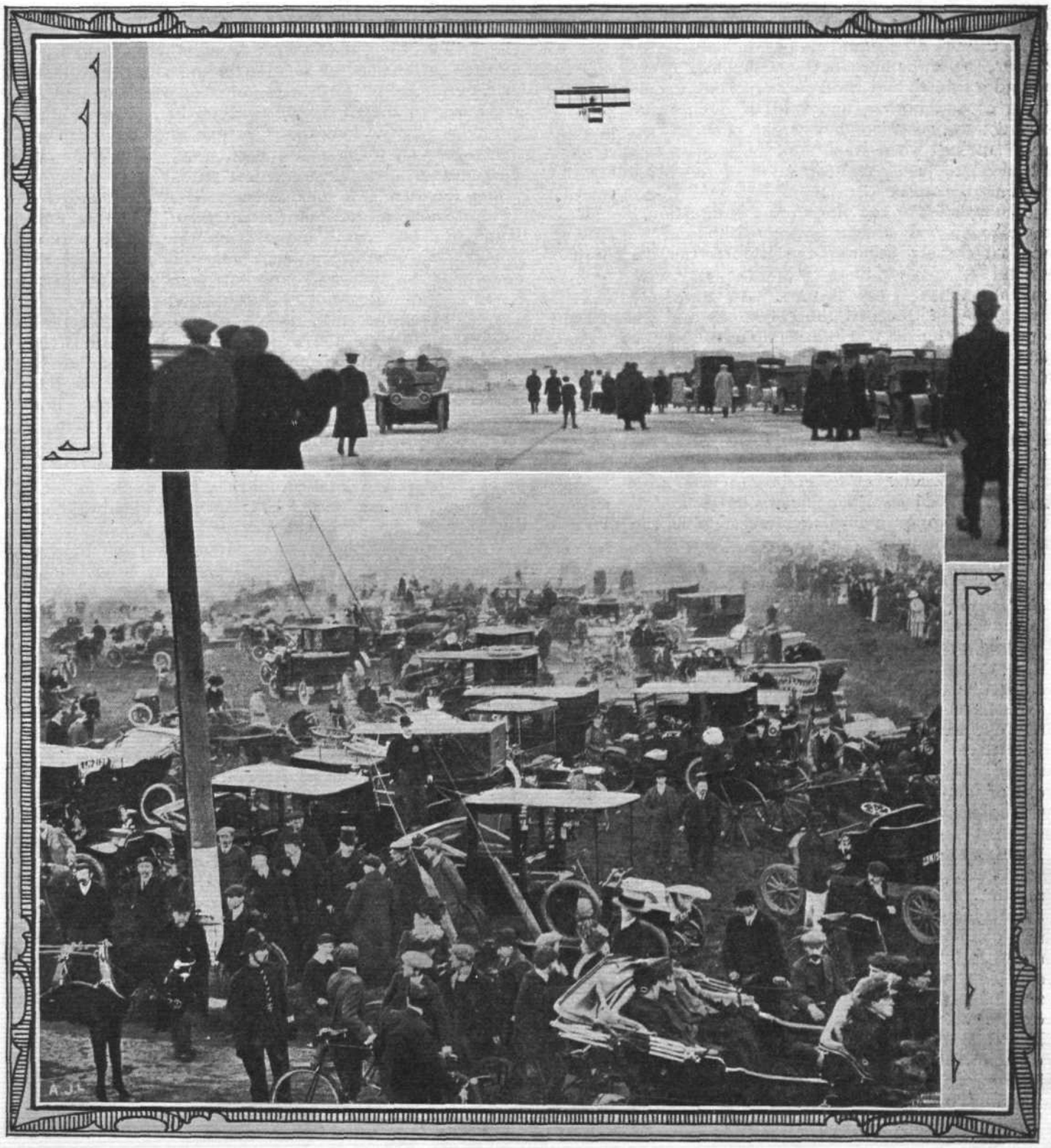


THE FLIGHT EXHIBITIONS FOR LONDONERS.—Above, Paulhan is seen flying down the straight at Brooklands over the motorists and their cars: and the scene below shows a few of the cars which assembled on Esher Common last Saturday in connection with Paulhan's flight demonstration at Sandown Park.

WHERE AMATEURS MAY FLY.

THE three first requirements for flight are courage, the means to acquire or build a machine, and the facilities, in the way of suitable ground space, for experiment and practice. Of these, one would be inclined to class the last as the most difficult of discovery, for it would be an insult to our race to doubt that there are plenty of men with the necessary pluck to make successful aviators, while so far as the financial side of the question is concerned, every man who now possesses a pleasure motor car might equally well purchase a flying machine, although it would be idle to suggest at the present stage that the aeroplane will rival the automobile in the ordinary uses of the latter. This elimination, therefore, shows up in relief the almost insurmountable difficulties that certain of our English pioneers have encountered in their efforts to find a smooth and level piece of land, unencumbered by trees and bushes, and void of ditches and similar obstructions, whereon they might practise "taking-off" and landing when their machines were sufficiently advanced to justify contemplation of the possibility of these movements.

The troubles of the pioneer in this direction, however, came to an end when the Aero Club and the Aeronautical Society secured the use of the Shellbeach ground in the Isle of Sheppey and the Dagenham ground on the mouth of the Thames. At these places, and particularly in Sheppey, the conditions are nearly ideal for the experimenter. He has ample space and adequate accommodation for any imaginable form that his progress may assume; he need not spend days or weeks in searching the country for a manufacturer of those little fitments such as wire-strainers and strut-sockets that must find a place on every aeroplane, for there are well-equipped workshops on the spot. But above all, if he have any novel design that he desires to keep from public knowledge until success or failure be assured, then can his tests be made in absolute secrecy. Still, Shellbeach has its disadvantages, and perhaps the chief of these is its distance from London, which is sufficiently great to entail residence near the ground if much valuable time is not to be wasted in journeying to and fro. There is little need to point out, therefore, that if Sheppey could be transported bodily to a site but a third the distance from the Metropolis, other advantages would be secured.

We have no Genie of the Lamp to perform this little operation, so Shellbeach must remain precisely where it is; but recent developments have given us the next best thing, a permanent flying ground within twenty miles of London. We refer, of course, to the Brooklands Automobile Racing Track, where Paulhan gave Londoners their first sight of an aeroplane in flight a fortnight ago. There is a ready-made aerodrome of compact proportions, and yet with a circumference of nearly three miles, which needs only surface-clearing to adapt it to its new purposes. Paulhan himself considered that for a competent aviator the ground left little to be desired, while even at that time when the preparation of the aerodrome was far from being complete, he thought that there was ample space on which the novice might learn the manipulation of his machine and make his first tentative attempts at flight. Since then the preparation has proceeded apace, and ultimately the interior of the Brooklands motor course will present a fine, flat, smooth and unencumbered space upon and over which either expert or novice may manœuvre in perfect safety. It will have all the principal qualities that are desirable in a semi-public flying ground, and even though its suitability for a competitive aviation meeting or for systematic experimental work, as distinct from the mere demonstration of the art of flying which Paulhan gave, may be a question for the future to decide, it will certainly offer exceptional opportunities for practising the use of aeroplanes.

It might appear at first sight that the new Brooklands ground would be in direct opposition to the established site at Shellbeach, but a second consideration shows that this is only so, if at all, to a very limited degree. That consideration, however, necessitates a forecast of the future. Upon whom, then, and in what direction must we depend for the development of aviation in the more or less immediate future? To a certain extent the new sport is analogous to automobilism, and analogy answers the question. In the long-ago days just after the birth of the motor car, when it had been brought to what was then considered a fairly practical state, certain men, of whom Fournier is a notable example, went around the various countries on demonstration tours. To-day we find Paulhan doing precisely the same thing, and with a similar result—the acquaintance of the public with the new form of locomotion, and the consequent popularisation of the sport. But up to that period in regard to automobilism the only people who took a practical interest in it were the experimenters, who ultimately developed into manufacturers, and just a handful of amateurs who entered into an investigation of the possibilities of mechanical propulsion for pure sport. But when the world at large, by the demonstrations of such as Fournier, had been acquainted with the progress that had been made, then came a host of amateurs who purchased cars and ran them for themselves. So another great world-business came to be built up, and so will the development of aviation take place.

We are now at the demonstration stage, but in the coming season the results of the flights at Brooklands, at Blackpool, and at Doncaster will be seen in a sudden rush of orders for aeroplanes. But where are all these machines to be flown? It is quite unlikely that every person who desires to purchase an aeroplane will care to give his whole time to the flying of it, even though he can afford to do so, for the new race of aeronauts that will soon come into existence will not be composed alone of the pioneer element that first made motoring and flying possible. Rather will it consist at first, at least, of people who regard flight as a new form of hobby, calculated to surpass and replace tobogganing at Davos, ski-ing, mountaineering, and similar delightful pastimes. These are the people who will not take the trouble to travel backwards and forwards between Shellbeach and London; nor would the expert experimentalist welcome them particularly if they arrived in their tens and hundreds down there. Hence a flying ground near London is essential to the development of the industry, and that requirement is fulfilled by Brooklands. Brooklands will be used by amateurs and by fledglings who are just learning to flap their wings, so to speak; while Shellbeach and Dagenham will continue to be the place at which manufacturers' experiments may be carried out, and where the scientific investigation of new devices may be made in secrecy.

FLIGHT PIONEERS.

THE HON. C. S. ROLLS.

THE ORGANISATION OF FLIGHT MEETINGS.

THERE are lessons to be learned from the flight meetings that have just taken place in England which are of a character that might well be borne in mind by others who contemplate similar organisations in the future.

The first point is the ground, and in this there is, of course, not often much latitude of choice, for it is unlikely that there will be more than one suitable spot in sufficient proximity to a town. For reasons associated with dealing with an immense traffic, such as may be anticipated in the event of fine weather, it is essential that the ground should be completely accessible by the ordinary means of locomotion, and on this score a race course would be more likely to be well served than other open spaces which have not previously figured as public resorts. Those who have not experienced the difficulties of transporting a hundred thousand people or so away from a place which each individual of the crowd is anxious to leave simultaneously, can have no proper appreciation of the importance of this point, but the scenes at Juvisy, in France, on a memorable Sunday a few weeks ago, when the traffic arrangements broke down, was a sufficiently striking object lesson of the serious nature of this side of the question. Organisers of flight meetings naturally want them to be a success from start to finish, and such being the case they should set to work with the idea that they are going to be successful and make their plans on an adequate basis from the first.

The ground itself should be as large as possible, and the whole of it should be visible from any point in the field. As to what is the minimum size with which it is any use hoping that the leading pilots will be satisfied, it is perhaps difficult to come to an exact conclusion, but both Farman and Paulhan informed us that they considered a circuit of three kilometres absolutely the smallest possible course. Much depends on the shape of the ground as to what sort of course can be marked out on it, but sharp angles must be avoided, at the same time that it is undesirable to curtail any long straight stretch which happens to be available.

The surface of the ground ought to be as smooth as possible, and obstructions must necessarily be removed. In doing so, however, it is of still greater importance to ensure that the work is carried out thoroughly and conscientiously, for a ditch merely hidden by a superficial covering is infinitely more dangerous than when left exposed. If there are any doubtful patches which it is impossible to repair, their presence should be emphasised by every possible means, and every pilot informed of them.

The laying out of the course and the arrangements of the grand stands and sheds is governed by two factors, one of which is the prevailing wind, and the other the preferred direction of flight. It may be assumed that the prevailing wind is south-west, and it happens that the French pilots, who at present are most to be considered, prefer to make their circuits in an anti-clockwise direction, that is to say, they would rather turn to the left when rounding a mark than turn to the right. This is, of course, a mere prejudice, resulting from custom.

There is an advantage in so placing the sheds that they face along the starting straight and in the direction of flight. This enables the machines to be driven away from the hangars direct on to the course, and ensures that all attempts at flight take place in full sight of the grand stands. There is a tendency, if the sheds are placed in some out of the way part of the field, for lots of interesting little proceedings to go on in comparative obscurity, whereas they ought to be contributing to the interest of the spectators.

It would be advantageous if a reasonable length, say not less than 100 yards, of prepared cinder-track were laid down for starting, and on the whole, it would probably be better to have such a track sufficiently wide and large to give a starting run in any direction, so that the machines could always head the wind, than to have a narrower track of greater length.

The sheds and grand stands represent a considerable expense, but both must be the best of their kind. It is possible, in connection with the sheds as with the stands, to contract for their erection and removal at a figure which is considerably below the purchase cost. Those put up at Blackpool—for a sum, we believe, of £60 apiece—were admirable except in respect to the roofing, which was made of some kind of fabric. This is liable to become torn in high winds, and moreover it is not thoroughly waterproof. Corrugated iron would probably afford the most satisfactory material for this work, and ought not to add materially to the expense of the shed if certain latitude were allowed the contractor so that he could use standard sizes. The canvas curtains used in lieu of doors appear to be reasonably satisfactory in conjunction with tent-pegs and other arrangements for lacing them firmly in place. They should be more securely fastened to the rings on which they are hung, however, as in some cases it was observed that they came unhooked. It is an excellent scheme to provide, as was done at Blackpool, a roped-off space in front of each shed, which remains the "private property" of the competitor.

On the subject of the organisation of the meeting itself, all that can be said is to draw attention to the necessity of maintaining public interest by some sort of continuous performance. Most of the prize money might advantageously be divided up into equal sums allotted to each day of the meeting, and we would strongly advocate special attention being given to the nature of the prizes for which beginners are eligible. We would suggest that a beginner be considered as a pilot who has not previously officially flown a certain specified distance of, say fifty yards. For each day of the meeting there might be allotted a series of prizes, of say £10 each, to be awarded to each and every beginner who makes a flight of fifty yards on that day. At the end of a week these competitors would stand to win a matter of £60 apiece; on the other hand, if they prefer to work in their sheds, they would win nothing, and, indeed, we are not sure that they ought not to forfeit something, at any rate for not being ready on the first day. This scheme of prize giving might be extended to include progressive flights of say a hundred yards and two hundred yards, with proportionate increments in the value of the prize. Some such arrangement as this ought to be a very effective means of keeping competitors constantly in the field and on the move, and that, in our opinion, is the great thing to be done if organisers of these meetings want to make them a success.

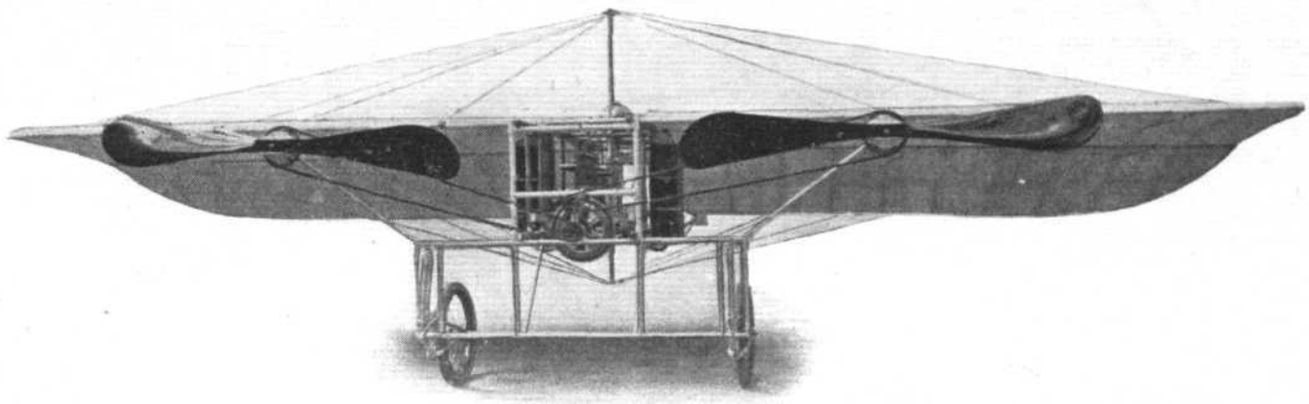
Bad weather goes, of course, a long way towards ruining everything, but one flight like Latham's is worth a lot, and might be encouraged by special prizes for flights in high winds and rain. Beyond this, the only alternative is to provide some sort of side-show in the form of kite-flying or miniature balloon competitions.

FLYER SILHOUETTES FROM THE PARIS SALON.

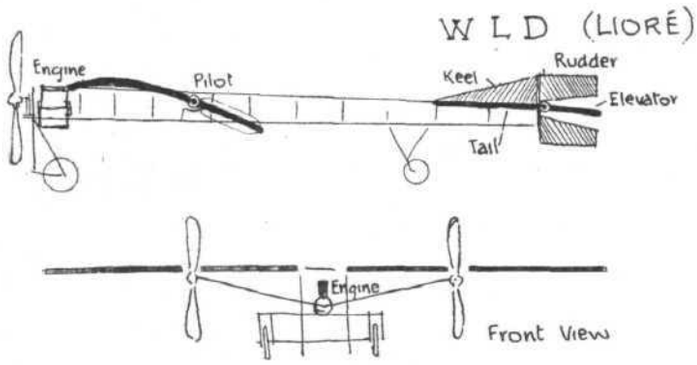
(*Continued from page* 690.)

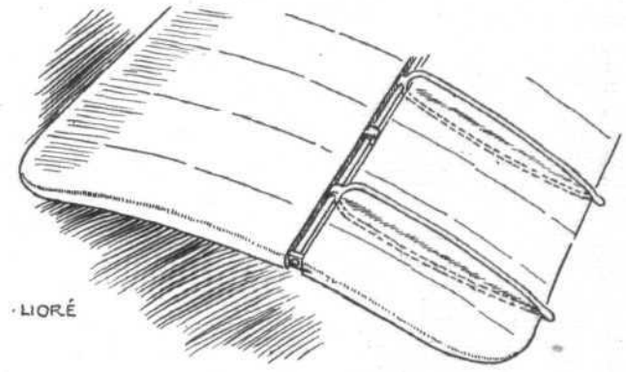
LIORE (W.L.D.).

MONOPLANE, in which the two principal characteristics are the divided wings and the twin tractor screws. Each wing is made in two parts of approximately equal proportions, the front member being rigidly connected to the frame and the trailing portion being hinged to the other half. The object is to obtain a wing of variable camber. No trials have, so far as we are aware, been made to demonstrate the practicability of handling such a device in actual flight. In order to overcome the obvious difficulty of keeping the trailing wings from bending out of shape, they have been enclosed in a kind of cage formed by a series of steel rods, which virtually perform the duty of external ribs. The arrangement of these rods is shown in an accompanying sketch,

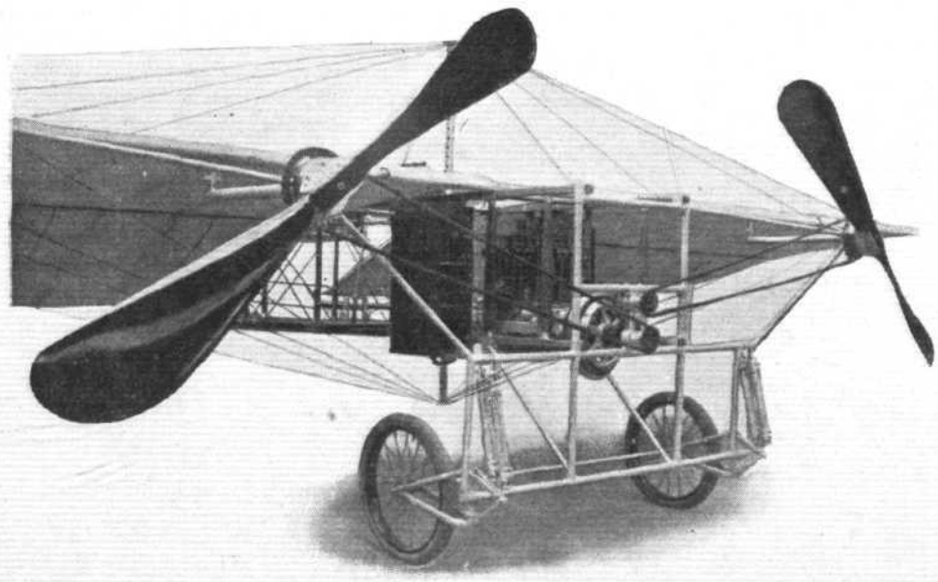


Liore (W.L.D.) Monoplane at Paris Flight Show.





Sketch showing the manner in which the trailing plane on the Liore flyer is held in a cage.



Liore (W.L.D.) Monoplane at Paris Flight Show, showing the clutch and gearing.

where it will be observed how they are attached to the hinge, and are the actual members by means of which variations of position are imparted to the wings.

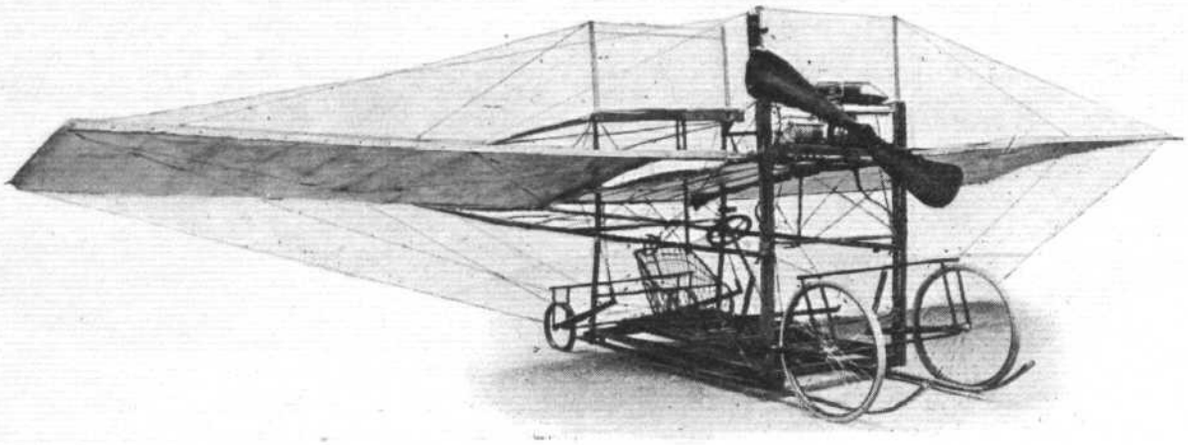
Another special feature, shown on a larger scale in one of our photographs, is the use of twin screws, driven in opposite directions from duplicate chain-sprockets. This latter is a precaution against the disturbing influence of the gyroscopic force produced by fly-wheel-like members such as propellers.

In the same illustration the elastic suspension of the chassis-wheels is shown very clearly. Elastic, either in conjunction with coiled steel or alone, is a favoured material for use in the suspension of flyers, and manufacturers are not hesitating to ask a high price for these new "springs," the material alone we have heard quoted at £5 per yard in the Salon.

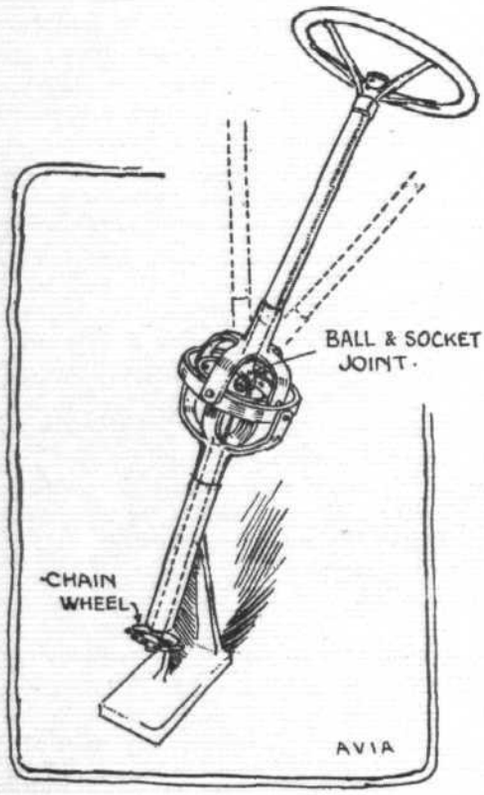
The chassis frame is made of tubular steel, and carries extensions which brace the propeller-brackets. These brackets are mounted on the leading spars of the wings, which are themselves stayed by many wires radiating from each extremity of a central mast.

AVIA.

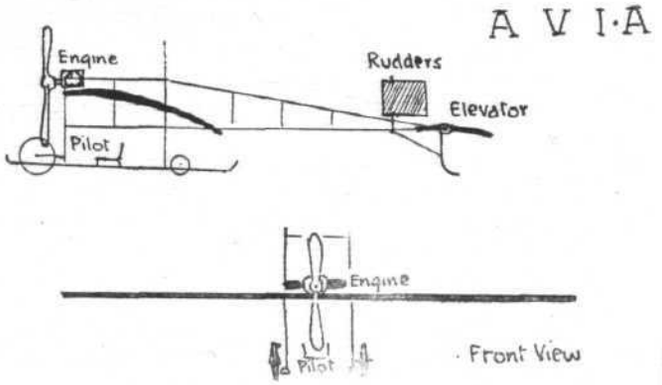
Small monoplane, peculiar for the arrangement of the pilot's seat on a kind of toboggan-like structure mounted under the wings. The system is sufficiently self-evident from our general view of the machine. The engine, it will be noticed, is mounted above the wings, but is supported on uprights direct by the chassis, and drives a two-bladed tractor screw.



Avia Monoplane at Paris Flight Show.



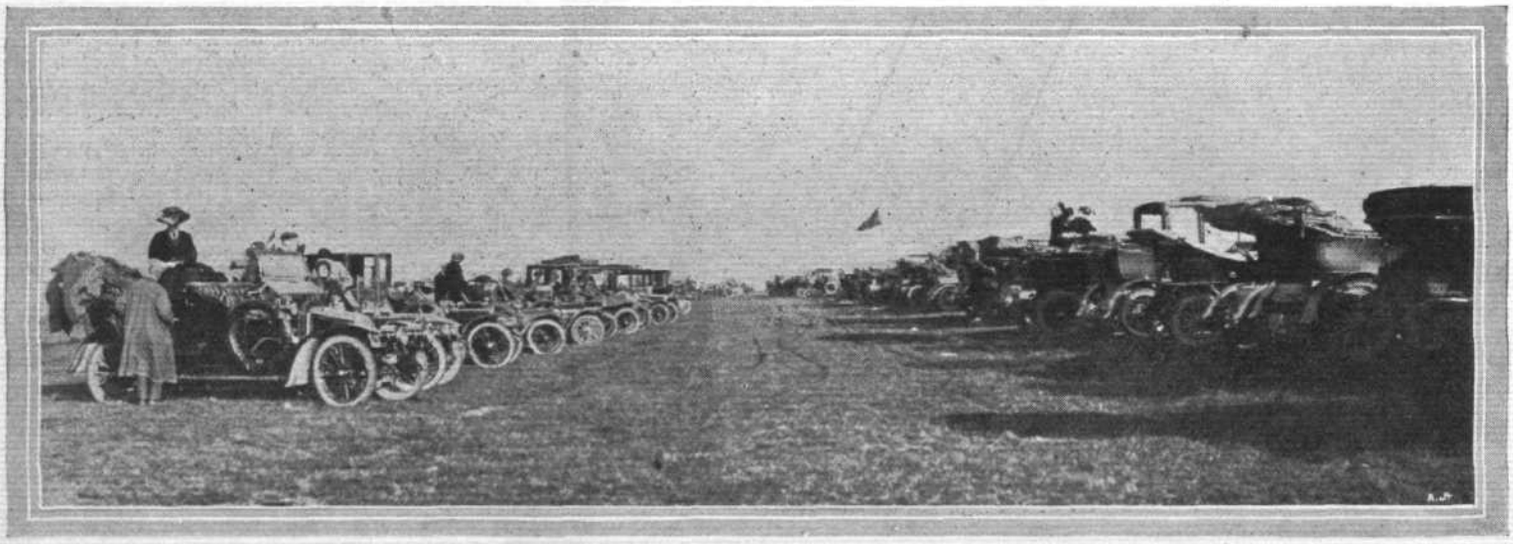
Sketch showing the universal control employed on the Avia flyer.



An interesting mechanical detail introduced by the makers, and placed on the market by them as an accessory, is a combination steering and controlling mechanism, designed on the principle of concentric spherical cages, each of which is a universal joint. The construction is approximately represented by the accompanying sketch. The device enables the steering column to be rotated or tilted either separately or simultaneously, according as it is required to operate one member or two at the same time.

Attention should also be drawn in the Avia flyer to the construction of wheels and ski on the chassis. The system is illustrated by our photograph of the complete machine.

The supplementary surfaces on the machine include an elevator and a rudder, both situated at the rear. Provision is also made for warping the wings.



A SCENE AT THE BLACKPOOL MEETING.—The Automobile Association Garage.

HOW TO GLIDE.

By WILBUR WRIGHT.

(*Continued from page* 694.)

Arched Wings.

IN several other glides there were disturbances of the lateral equilibrium more marked than we had been accustomed to experience with the former machines, and we were at a loss to know what the cause might be. The new machine had a much greater tip-to-tip dimension than our former machines; it also had a vertical tail, while the earlier ones were tailless; and the wing tips were on a line with the centre, while the old machines had the tips drawn down like a gull's wings. The trouble might be due to either of these differences. We decided to begin alterations at the wing tips, and the next day made the necessary changes in the trussing, thus bringing the tips 6 ins. lower than the centre.

For several days thereafter the weather was not suitable for gliding on account of rain, but finally the sky cleared and the machine was taken out again. As the anemometer indicated a wind velocity of more than 11 metres a second, it was thought best to make use of the Little Hill in testing the effect of the changes that had been made. But later in the day, when the velocity fell to about 9 metres a second, the Big Hill was tried again.

Gliding Backwards: An Alarming Incident.

On this day my brother Orville did most of the gliding. After a few preliminary flights to accustom himself to the new method of operating the front rudder, he felt himself ready to undertake the management of the lateral control also. Shortly afterward he started on a flight with one wing slightly higher than the other. This caused the machine to veer to the left. He waited a moment to see if it would right itself, but finding that it did not, then decided to apply the control. At the very instant he did this, however, the right wing most unexpectedly raised much worse than before, and led him to think that possibly he had made a mistake. A moment of thought was required to assure himself that he had made the right motion, and another to increase the movement. Meanwhile, he had neglected the front rudder by which the fore and aft balance was maintained. The machine turned up in front more and more till it assumed a most dangerous attitude. We who were on the ground noticed this in advance of the aviator, who was thoroughly absorbed in the attempt to restore the lateral balance, but our shouts of alarm were drowned by the howling of the wind. It was only when the machine came to a stop and started backward that he at length realised the true situation. From the height of nearly thirty feet the machine sailed diagonally backward till it struck the ground. The unlucky aeronaut had time for one hasty glance behind him, and the next instant found himself the centre of a mass of fluttering wreckage. How he escaped injury I do not know, but afterward he was unable to show a scratch or bruise anywhere, though his clothes were torn in one place. This little misadventure, which occurred almost at the very beginning of our practice with the new machine, was the only thing approaching an accident that happened during these experiments, and was the only occasion on which the machine suffered any injury.

Good Advice.

The latter was made as good as new by a few days' labour, and was not again broken in any of the many hundred glides which we subsequently made with it. By long practice, the management of a flying machine should become as instinctive as the balancing movements a man unconsciously employs with every step in walking, but in the early days it is easy to make blunders. For the purpose of reducing the danger to the lowest possible point, we usually kept close to the ground. Often a glide of several hundred feet would be made at a height of a few feet or even a few inches sometimes. It was the aim to avoid unnecessary risk. While the high flights were more spectacular, the low ones were fully as valuable for training purposes. Skill comes by the constant repetition of familiar feats rather than by a few over bold attempts at feats for which the performer is yet poorly prepared.

The Rear Tail and its Conversion.

It had not been noticed during the day that when a side gust struck the machine its effect was at first partly counteracted by the vertical tail, but after a time when the machine had acquired a lateral motion, the tail made matters worse instead of better. Although the change that had been made in the wing tips made some improvement, the lateral control still remained somewhat unsatisfactory. The tail was useful at times, and at others was seriously in the way. It was finally concluded that the best way of overcoming the difficulty was by making the tail movable like a rudder. As originally built, the fixed vertical tail or vane was double, but in changing to a movable rudder it was made single, as the smaller area was believed to be sufficient. As reconstructed, it spread a little less than 6 sq. ft. With this improvement our serious troubles ended, and thereafter we devoted ourselves to the work of gaining skill by continued practice.

When properly applied, the means of control proved to possess a mastery over the forces tending to disturb the equilibrium. Since balancing was effected by adjustments of the surfaces, instead of by movements of weight, the controlling forces increased in power in the same ratio as the disturbing forces, when the machine was suddenly struck by a wind gust. For this reason we did not seem to experience the same difficulty in managing the machine in high winds that Lilienthal, who used a different system, seems to have met. Fully half of our glides were made in winds of 10 metres a second—over 20 miles an hour. One day we stopped gliding for a moment to take an anemometer reading, and found that it indicated 16·7 metres a second—37 m.p.h. Of course, such high winds require much greater readiness on the part of the operator than the low winds, since everything happens much more quickly, but otherwise the difference is not so very marked.

Balancing.

In those machines which are controlled by the shifting of weight, the disturbing influences increase as the square of the velocity, while the controlling factor remains a constant quantity. For this reason a limit to the wind velocity which it is possible to safely encounter with such machines is soon reached, regardless of the skill of the operator. With the method we have been using, the capacity of control is evidently very great. The machine seems to have reached a higher state of development than the operators. As yet we consider ourselves little

more than novices in management. A thousand glides is equivalent to about four hours of steady practice, far too little to give anyone a complete mastery of the art of flying. Progress is very slow in the preliminary stages, but when once it becomes possible to undertake continuous soaring, advancement should be rapid.

Soaring.

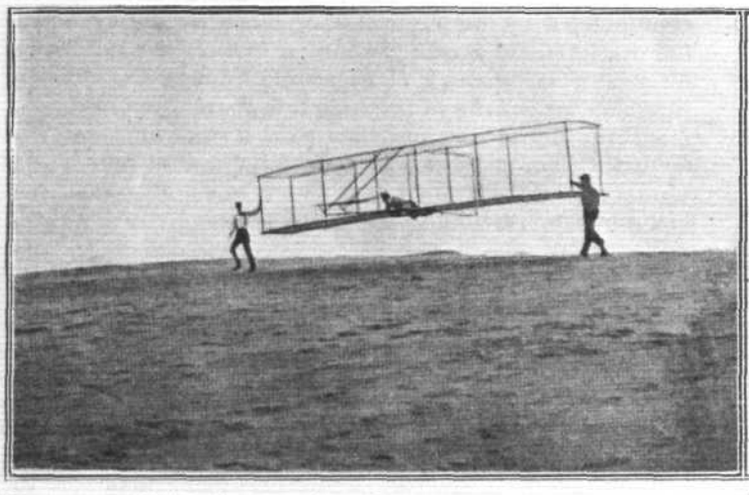
Under special conditions, it is possible that this point is not so far away as might be supposed. Since soaring is merely gliding in a rising current it would be easy to soar in front of any hill of suitable slope whenever the wind blew with sufficient force to furnish support, provided the wind were steady. But by reason of changes in wind velocity, there is more support at times than is needed, while at others there is too little, so that a considerable degree of skill, experience, and sound judgment is required in order to keep the machine exactly in the rising current. So far, our only attempts at soaring have been made on the Little Hill, which has a slope of only 7°. In a wind blowing from 11 to 16 metres a second, we frequently made glides of 8 to 15 seconds duration with very little forward motion. As we kept within 5 or 6 ft. of the ground, a momentary lessening of the wind speed, or a slight error in judgment, was sufficient to bring about a landing in a short time. The wind had too little rising trend to make soaring easy. The buzzards themselves were baulked when they attempted to soar on this hill, as we observed more than once. It would be well within the power of the machine to soar on the Big Hill, which has steeper slopes, but we have not felt that our few hours of practice is sufficient to justify ambitious attempts too hastily. Before trying to rise to any dangerous height a man ought to know that in an emergency his mind and muscles will work by instinct rather than by conscious effort. There is no time to think.

Suitable Winds.

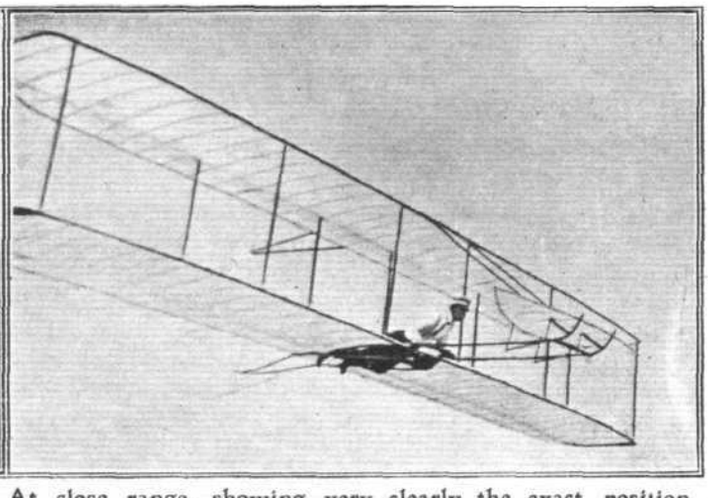
During a period of five weeks glides were made whenever the weather conditions were favourable. Many days were lost on account of rain. Still more were lost on account of light winds. Whenever the breeze fell below six miles an hour, very hard running was required to get the machine started, and the task of carrying it back up the hill was real labour. A relative speed of at least 18 miles an hour was required for gliding, while to obtain a speed of 12 miles by running required very severe exertion. Consequently, unless the wind blew in our faces with a speed of at least six miles, we did not usually attempt to practise; but when the wind rose to 20 miles an hour, gliding was real sport, for starting was easy and the labour of carrying the machine back up-hill was performed by the wind. On the day when the wind rose to over 16 metres a second we made more than a hundred glides with much less physical exhaustion than resulted from twenty or thirty glides on days when the wind was light. No complete record was kept of all the glides made during the season. In the last six days of experiment we made more than 375, but these included our very best days. The total number for the season was probably between 700 and 1,000. The longest glide was 622½ ft., and the time 26 seconds.

Lessons of the Trials.

The prime object of these experiments was to obtain practice in the management of a man-carrying machine, but an object of scarcely less importance was to obtain data for the study of the scientific problems involved in flight. Observations were almost constantly being made for the purpose of determining the amount and direction of the pressures upon the sustaining wings; the minimum speed required for support; the speed and angle of incidence at which the horizontal resistance became least; and the minimum angle of descent at which it was possible to glide.



Starting a flight, showing how the two assistants run alongside while launching.



At close range, showing very clearly the exact position occupied by Wilbur Wright in gliding. The machine illustrated is the 1902 model fitted with a rudder.

To determine any of these points with exactness was found to be very difficult indeed, but by careful observations under test conditions it was possible to obtain reasonably close approximations. It was found that a speed of about 16 miles an hour would produce a pressure sufficient to support machine and operator, but the angle of incidence was too great for general gliding purposes. At 18 miles the angle of incidence was about 8°, and the machine would glide on the Little Hill, descending at an angle of a little over 7°. Although the wings were inclined slightly above the horizon the machine continued to glide without loss of velocity. With a speed of 22 miles an hour, the angle of incidence required for support was 4° or 5°, and the angle of descent a little less than 7°. At this speed the surfaces were inclined several degrees below the horizon. As the speed became greater the angle of incidence continued to grow less, but the angle

of descent became greater again, thus showing that the point of minimum resistance had been passed. Scores of glides were made at angles of descent under 6°, and in a few cases we reached 5°. On the last day of experiment we made a few attempts at records. A line was drawn a short distance up the slope as a starting mark, and four trials were made. Twice the machine landed on the same spot. The distance was 156½ ft., and the angle of descent exactly 5°; time 6½ secs. From a point higher up the slope the best angle was 5° 25′ for a glide 225 ft.; time 10¼ secs. The wind was blowing about 9 miles an hour. The glides were made directly to windward and straight down the slope. Taking 7° as a conservative estimate of the normal angle of descent, the horizontal resistance of the machine was 30 lbs., as computed by multiplying the total weight, 250 lbs. by the tangent of the angle of descent. This resistance remained nearly constant at speeds between 18 and 25 m.p.h. Above or below these limits there was a somewhat rapid increase. At 18 miles the power consumed was 1 and 1½-h.p.; at 25 miles, 2-h.p. At the slower speed, 166 lbs. were sustained for each h.p. consumed; at the higher speed 125 lbs. per h.p. Between 18 and 25 miles the h.p. increased almost in exact ratio to the increase in speed, but above or below these limits the power increased rapidly, and with a constantly accelerating ratio.

On two occasions we observed a phenomenon whose nature we were not able to determine with certainty. One day my brother noticed in several glides a peculiar tapping as if some part of the machine were loose and flapping. Careful examination failed to disclose anything about the machine which could possibly cause it. Some weeks later, while I was making a glide, the same peculiar tapping began again in the midst of a wind gust.

It felt like little waves striking the bottom of a flat bottomed row-boat. While I was wondering what the cause could be, the machine suddenly, but without any noticeable change in its inclination to the horizon, dropped a distance of nearly ten feet, and in the twinkling of an eye was flat on the ground. I am certain that the gust went out with a downward trend which struck the surfaces on the upper side. The descent was at first more rapid than that due to gravity, for my body apparently rose off the machine till only my hands and feet touched it. Toward the end the descent was slower. It may be that the tapping was caused by the wind rapidly striking the surfaces alternately on the upper and the lower sides. It is a rule almost universal that gusts come on with a rising trend and die out with a descending trend, but on these particular occasions there must have been a most unusual turmoil during the continuance of the gust which would have exhibited a very interesting spectacle had it been visible to the eye. Irregularities of the wind are most noticeable when the wind is high, on account of the greater power then exhibited, but light winds show almost equal relative variations. An aviator must expect to encounter in every flight variations in velocity, in direction, and in upward or downward trend. And these variations not only give rise to those disturbances of the equilibrium which result from the travel of the centre of pressure due to the changed angle of incidence, but also, by reason of the fact that the wind-changes do not occur simultaneously or uniformly over the entire machine, give rise to a second series of disturbances of even more troublesome character. Thus a gust coming on very suddenly will strike the front of the machine and throw it up before the back part is acted upon at all. Or the right wing may encounter a wind of very different velocity and trend from the left wing and the machine will tend to turn over sidewise. The problem of overcoming these disturbances by automatic means has engaged the attention of many very ingenious minds, but to my brother and myself it has seemed preferable to depend entirely on intelligent control. In all of our machines the maintenance of the equilibrium has been dependent on the skill and constant vigilance of the aviators.

(*To be continued.*)

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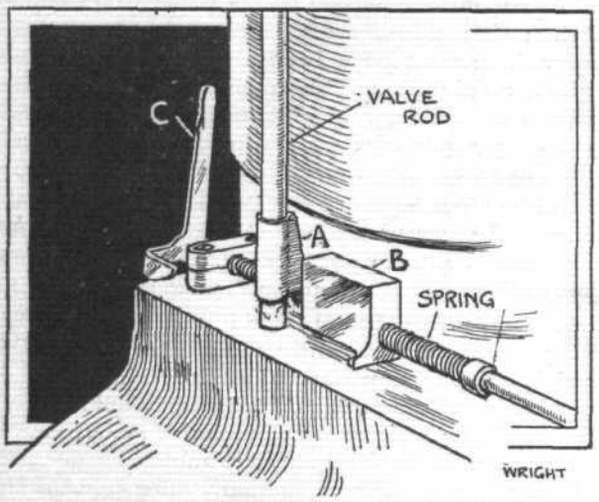
TABLE OF FRENCH FLYERS.

The interesting particulars given below are reproduced exactly as they have been published in France.

Flyer.	Type.	Maker.	Propellers.	Supporting Area.	Dimensions.		Engine.			Weight of Flyer without Pilot.	Price in France.
					Length.	Span.	Makers.	Type.	Horse-power.		
				m.q.	metres	metres				kilogs.	francs.
Antoinette	Monoplane ...	Sté. Antoinette ...	1	35	12	14	Sté. Antoinette ...	8 cyl.	50	475	25,000
A.V.I.A.	Monoplane ...	Ateliers Vosgiens ...	1	14	7	7·50	Dutheil-Chalmers ...	2 cyl.	30	200	8,000
Blériot XI	Monoplane ...	Etabliss. Blériot ...	1	14	7·50	8·60	Anzani	3 cyl.	24	210	12,000
Blériot XII... ...	Monoplane ...	Etabliss. Blériot ...	1	27	7·60	9·60	E.N.V.	8 cyl.	70	450	26,000
Chauvière	Biplane ...	Penteado	1	20	6·50	10	R.E.P.	7 cyl.	35	140	12,000
Clément-Bayard ...	Biplane ...	Clément-Bayard ...	1	60	11·65	12	Clément-Bayard ...	4 cyl.	43	450	17,000
De Dion-Bouton ...	Multiplane ...	De Dion-Bouton ...	4	62	9	12	De Dion-Bouton	8 cyl.	100	700	—
Farman	Biplane ...	H. Farman ...	1	40	12	10	Gnome (revolving) ...	7 cyl.	45	450	28,000
Gangler	Monoplane ...	Gangler	1	27	9·50	11	Gyp	4 cyl.	40	295	25,000
Grégoire-Gyp ...	Monoplane ...	P. J. Grégoire ...	1	22	11	10	P. J. Grégoire ...	4 cyl.	40	300	12,500
Hanriot I	Monoplane ...	Hanriot	1	24	9·60	9·17	Hanriot	4 cyl.	35	335	20,000
Hanriot II	Monoplane ...	Hanriot	1	24	9·60	9·17	Buchet	6 cyl.	50	400	22,000
Kœchlin	Monoplane ...	Kœchlin	1	18	7·50	8	P. J. Grégoire ...	4 cyl.	24	260	14,000
R.E.P.	Monoplane ...	R. Esnault-Pelterie	1	21	8·50	10·80	R. Esnault-Pelterie ...	7 cyl.	33	355	30,000
Santos-Dumont ...	Monoplane ...	Clément-Bayard ...	1	10	6·20	5·50	Clément-Bayard ...	2 cyl.	25	110	7,500
Sté. de Construct. d'Appareils Aériens	Monoplane ...	Sté. de Construct. d'Appareils Aériens	1	20	8	10	Anzani	2 cyl.	25	220	12,500
Vendôme	Monoplane ...	Vendome et Cie. ...	1	22	11	11	Anzani	2 cyl.	30	270	15,000
Vuitton-Hubert ...	Hélicoptère ...	—	3	—	5	6	—	—	120	169	—
Voisin	Biplane ...	Voisin Frères ...	1	50	12	11·50	Antoinette or Gnome	—	50	500	25,000
W.L.D.	Monoplane ...	Loiré et Cie. ...	2	20	8·70	8·70	Buchet	4 cyl.	35	300	12,000
W.L.D.	Biplane ...	Loiré et Cie. ...	2	50	10	10	Renault	8 cyl.	60	550	22,000
Wright	Biplane ...	Sté. Ariel	2	50	8·50	12·50	Barriquand & Marre	4 cyl.	25	400	30,000

FLIGHT ENGINES AT PARIS SHOW—(*continued from page 710*).

Wright 30-h.p.—The Wright 30-h.p. engine, which is made in France by Messrs. Bariquand and Marre, is the only model of the Wright Brothers' design on the market. A photograph of this appeared in our issue of March 20th, on page 161, and the accompanying drawings supplement that description. It is of the 4-cyl. vertical type, and is characterised by extreme neatness of appearance. The cylinders are steel castings, and in one piece with the heads, which carry the interchangeable valves in an inverted vertical position.

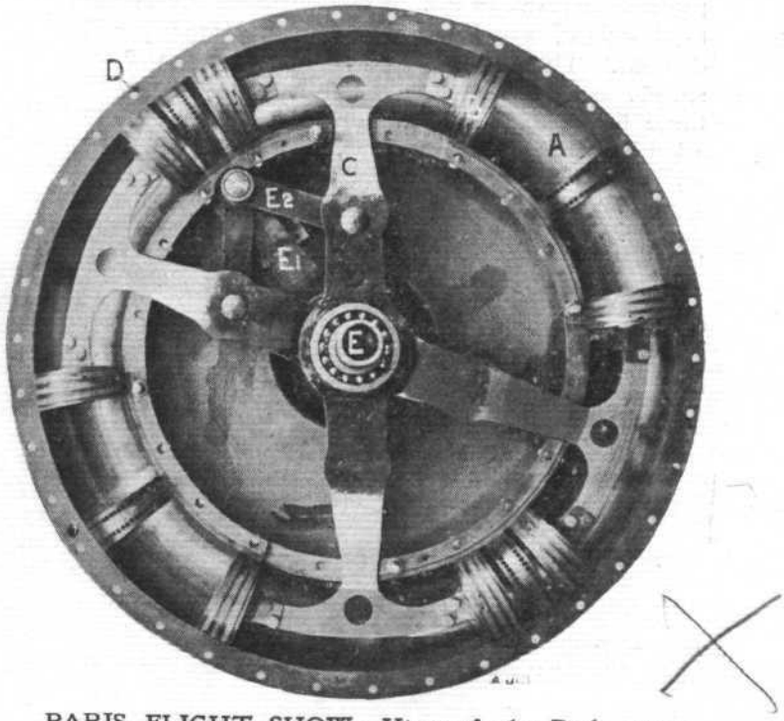


PARIS FLIGHT SHOW.—Sketch showing the mechanism for holding up the exhaust-valve tappets on the Wright engine. The block, B, slides automatically under a lug, A, attached to the valve-rod when the lever, C, has been placed in such a position as to compress the spring.

The crank-chamber is a one-piece aluminium casting, somewhat on the lines of a marine engine, one side and the ends being closed by detachable aluminium plates. The crank-shaft is supported by five bearings, which are lubricated by oil from a small gear pump situated outside the crank-chamber, and driven by a transverse shaft from the crank-shaft through skew gearing. Another precisely similar pump is used in lieu of a carburettor to inject petrol into the induction-pipe; the induction-pipe itself is open to atmosphere within an inch of the petrol jet. The induction-valves are atmospheric, while the exhaust-valves are mechanically operated by overhead rock-levers. A device is provided to relieve the compression by holding the exhaust-valves open; it consists of a sliding bolt, which can be drawn under catches on the tappet-rods. Magneto ignition is provided, and pump circulation for the water. The pump is direct-driven from the crank-shaft. The water-jackets consist of aluminium tubes, held in place by shrunk steel rings; no water passes across the tops of the cylinder-heads. The pistons are made of steel, and the connecting-rods are steel tubes having the big and little ends brazed in place.

Dimensions.—112 mm. by 100 mm.; weight, 96 kilogs.; h.p., 30 at 1,300 r.p.m.; price, 10,000 francs.

Beck.—Rotary engine of original design. An annular cylindrical track, A, formed by two casings bolted together, is divided into four equal sections, each of which comprises one "cylinder." In each cylinder thus formed are two pistons, B, coupled together rigidly by a bar, B^1; in all there are four such double pistons. The casing containing them is mounted so that it can rotate about a fixed crank-shaft, E, having a single crank.



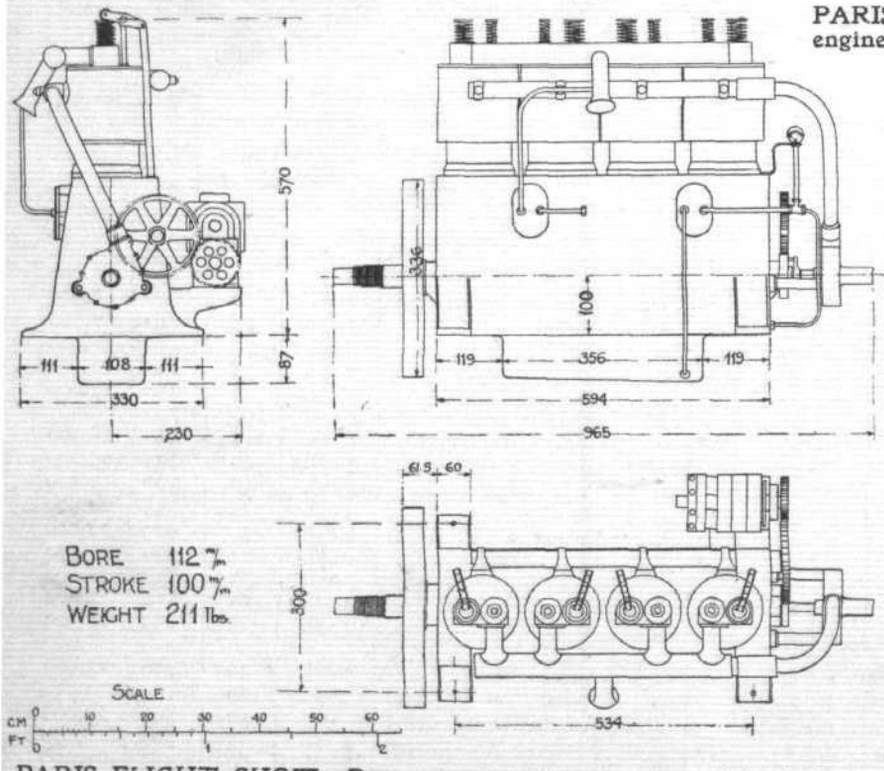
PARIS FLIGHT SHOW.—View of the Beck rotary engine showing the pistons, B, in the curved cylinder, A. The perforated sleeve, D, forms the valve.

The crank carries a connecting-rod, E^1, which in turn is coupled up by a pair of links, E^2, to two arms, C, which are mounted freely on the stationary shaft and cross one another. It is to the ends of these arms, C, that the double pistons are fixed.

An explosion takes place between a pair of pistons, which recede from one another and draw apart the links by means of the crossed arms. The hinge between the links forms the gudgeon-pin of the connecting-rod, and the radial motion thus communicated to it is converted into a rotary motion of the casing by the reaction on the stationary crank-shaft. This reaction is precisely the same as in any ordinary rotary engine.

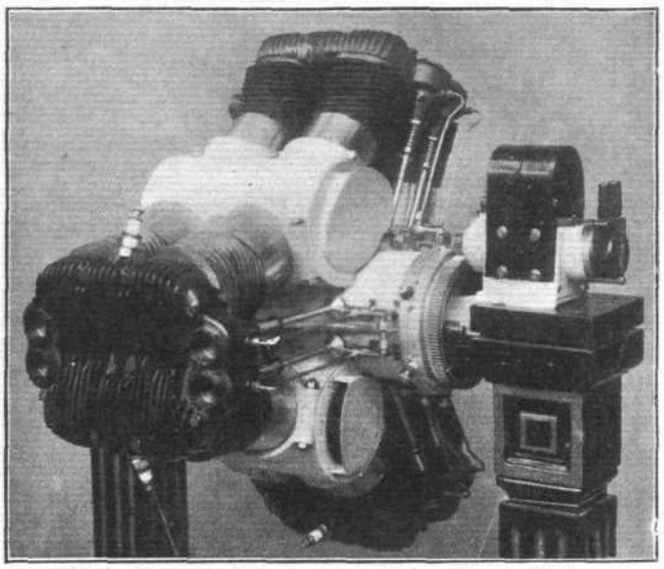
There are two explosions per revolution, as in an ordinary four-cycle engine. The admission and exhaust are controlled by a small reciprocating sleeve uncovering perforations in another sleeve, D, inside which it works. One row of holes are for the inlet of the mixture, while the others form a passage for the exhaust. This valve, D, is situated inside the combustion space, the mixture arriving by external pipes *via* a hollow crank-shaft. No special provision is made for cooling beyond the rotation of the casing in the air; the casing is not ribbed.

Dimensions.—80 mm. by 180 mm.; weight, 40 kilogs.; h.p., 40; price, 10,000 francs.



PARIS FLIGHT SHOW.—Dimensioned outline drawing of the 30-h.p. Wright engine as made by Messrs. Bariquand and Marre.

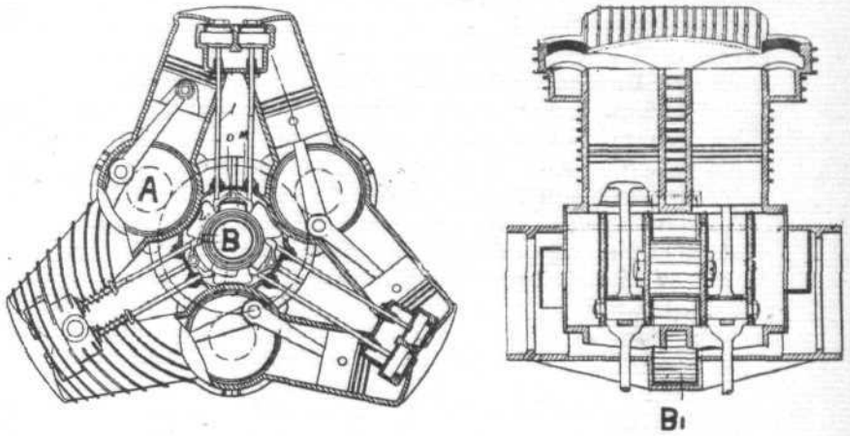
Breton 60-h.p.—Twelve-cylinder air-cooled rotary engine, so constructed that the cylinders fire in pairs, and thus give the effect of a 6-cyl. engine. The cylinders are cast separately, but the cylinder-heads for four adjacent cylinders form a single casting. A group of our cylinders thus arranged forms an inverted V; there are three



PARIS FLIGHT SHOW.—The Breton 12-cyl. 60-h.p. rotary engine.

such groups. The most convenient way to regard the construction of this engine is to take it as being composed of a set of three twin-cylinder horizontal opposed engines, joined together at the cylinder-heads in the form of a triangle. There are thus three crank-shafts, A, midway along each side of the triangle, and in the centre space a main shaft, B, connecting with the other three by spur gearing, B^1, having a ratio of 1 to 4. The planetary crank-shafts have a speed of 1,600 r.p.m.; the rotation of the engine *en bloc* about the main shaft is therefore 400 r.p.m.

All the valves are mechanically operated from a cam on the main shaft. No special attention seems to have been paid to the question of centrifugal force on the valves. Fuel is injected into the valve-chambers by separate pumps, worked off the valve tappet-rods. Air is drawn into the crank-chamber by fans on the crank-shafts for cooling purposes: the cylinder walls are, of course, ribbed. Ignition



PARIS FLIGHT SHOW.—Sectional elevation of the Breton rotary engine. There are three crank-shafts, A, arranged in epicyclic fashion round a central stationary shaft, B, with which they are in mesh.

is provided by a stationary magneto, driven by a gear-wheel attached to the rotating crank-chamber. Oil is fed into the centre shaft, and is distributed haphazard by the gearing inside the crank-chamber.

Dimensions.—82 mm. by 85 mm.; weight, 90 kilogs.; h.p., 60 at 400 r.p.m.; price, 10,000 francs.

(*To be continued.*)

Cantor Lectures on Aeronautics.

COMMENCING on the 29th inst., Mr. C. C. Turner will deliver a series of four Cantor Lectures before the Society of Arts on the subject of "Aeronautics." The full synopsis of the lectures is as follows:—

Lecture I.—November 29th. Aerostats and aeronefs; ballooning and its future; possible lines of development; kites; birds; is flapping wing flight imitable?; soaring flight; gliding flight; action of the air on plane and curved surfaces; the leading or "entering" edge; aspect ratio; the inclined plane; the curved plane; the concavo-convex plane; the gliding angle; air resistance; stream-line form; the atmosphere; different qualities of air; air propellers.

Lecture II.—December 6th. Dirigible balloons; comparative efficiency of different types; the elevator; the ballonette; the compartment system; methods of suspension; stability; motors and propellers; the ascent and the landing; harbours; capacity and utility of dirigible balloons.

Lecture III.—December 13th. Aeroplanes, helicopters, and ornithopters; present failure of the two latter; the simple glider; principles of stability; the question of automatic stability; the relation of speed to stability; various methods of obtaining stability; the compartment system; adjustable planes; flexible planes; some suggestions; starting and alighting; position of the pilot.

Lecture IV.—December 20th. Flying machine motors and propellers; specialised flying machines; differentiation of type; limitations; practical results; uses of the flying machine; navigation of the air; flying by night; special maps and landmarks; possibilities in war.

Pilot-Aviators' Certificates.

IN all the events held under their jurisdiction in 1910, the Aero Club de France will demand that all competitors shall be possessed of their *pilote-aviateur* certificate. It will be issued without fee to those aviators who demand it after having on three different days in the course of one month, flown round a closed circuit of at least a kilometre.

The Green Flight Engine.

THE winning of the *Daily Mail* £1,000 prize for the first circular mile by an all-British machine, besides being a triumph for the aviator and Messrs. Short Bros., who designed and built the flyer, was a victory upon which Messrs. Green's Motor Patents Syndicate are to be congratulated, for the 50–60-h.p. "Green" engine fitted to the machine gave not the slightest trouble. In this connection it is interesting to note that the latter firm maintain that there is now no difficulty with regard to a British-built engine, and all that is needed to place Great Britain in the forefront in the new industry and science is the men. As soon as suitable men able to manipulate the flyers are forthcoming, they will find British-built flyers and engines ready for them. The Green engine is finding favour among British aviators, and Mr. Jack Humphreys has now fitted one to his monoplane.

Austrian-American Indiarubber Mang. Co.

IN reference to a paragraph inserted recently *re* the above Company, the manufacturers of the gas-vessel of the Renner dirigible airship, a postcard has been received by the Company on which the address is omitted. The writer thereof is therefore requested to communicate again with the manager at 25, Milton Street, E.C.

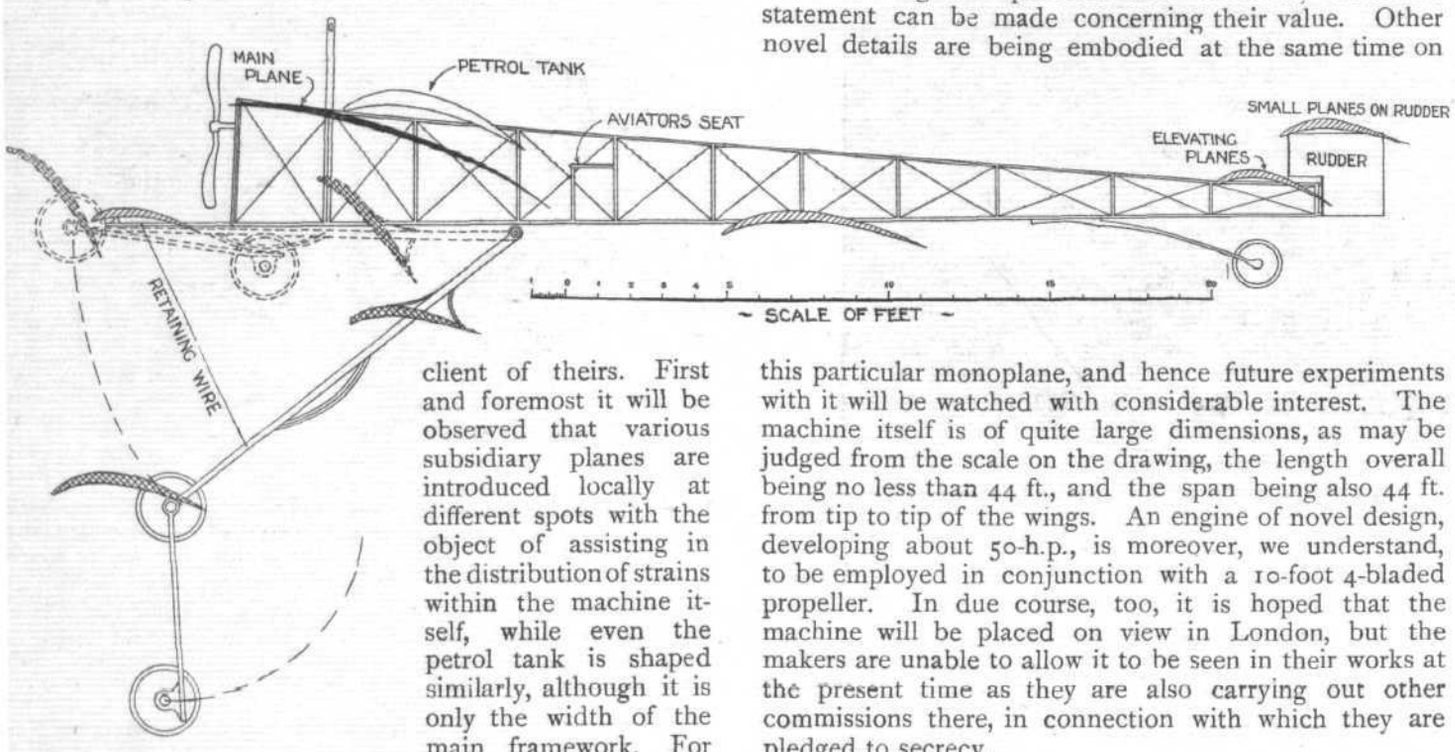
"Dermisilk" for Aeroplanes and Models.

WITH reference to the paragraph in last week's issue regarding the light waterproofed silk introduced by Mr. E. S. Jones under the above name, we regret that by a typographical error the prices were not correctly given. They range from 2*s.* to 5*s.* per square yard, according to the strength of the material.

ORIGINALITY IN MONOPLANE DESIGN.

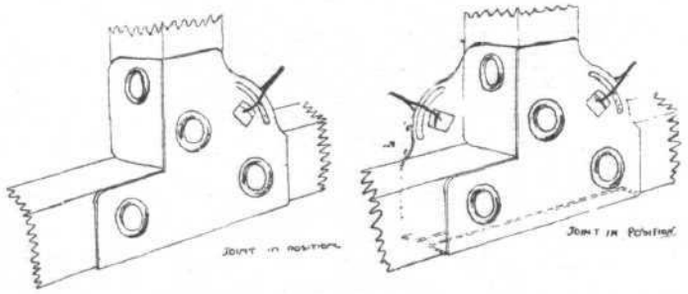
AN EXPERIMENTAL MACHINE NOW BUILDING IN LONDON.

VARIOUS unusual features have been embodied in the monoplane of which we reproduce a side elevation herewith, and which is being constructed by the Aerial Manufacturing Co. of Great Britain and Ireland for a client of theirs. First and foremost it will be observed that various subsidiary planes are introduced locally at different spots with the object of assisting in the distribution of strains within the machine itself, while even the petrol tank is shaped similarly, although it is only the width of the main framework. For convenience of reference, the main plane is shown in black, the small supplementary planes, including the elevator, are cross-hatched, and the petrol tank is merely shown in outline in the drawing.



Hardly less noticeable is the curious double-hinged framework, with its wheels in front, that is intended to facilitate starting and alighting. In the position indicated by the full lines, the two small planes carried by it (double cross-hatched) serve to assist in lifting the machine, while since the lower wheel leaves the ground last, the full weight is only taken after a fair altitude has been attained. The further object of the arrangement is to cushion the descent by allowing the lower wheel to reach the ground some time prior to arrival of the complete machine, and then, as the hinges allow the framework to fold up into the position indicated by the dotted lines, to cause the small planes to act as brakes, retarding further forward progress, at the same time that the leaf springs absorb shocks due to any roughness of the ground.

Needless to say both the above-mentioned systems need to be given a practical trial before any conclusive statement can be made concerning their value. Other novel details are being embodied at the same time on this particular monoplane, and hence future experiments with it will be watched with considerable interest. The machine itself is of quite large dimensions, as may be judged from the scale on the drawing, the length overall being no less than 44 ft., and the span being also 44 ft. from tip to tip of the wings. An engine of novel design, developing about 50-h.p., is moreover, we understand, to be employed in conjunction with a 10-foot 4-bladed propeller. In due course, too, it is hoped that the machine will be placed on view in London, but the makers are unable to allow it to be seen in their works at the present time as they are also carrying out other commissions there, in connection with which they are pledged to secrecy.



Sketch of a bracket for joints of framework of aeroplanes which is being manufactured by the Aerial Manufacturing Company of Great Britain and Ireland, of Upper Charles Street, Finsbury. Great rigidity and lightness are claimed for these, whilst the price is quite small, we understand. The sketch shows a single bracket, and also one each side of a joint, making a very rigid fixture, with wiring connection included.

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An Aviation Catalogue.

A REMINDER that flight is rapidly attaining a commercial position is to hand in the shape of a catalogue issued by the Richelieu-Automobiles, Paris. It contains particulars and prices of Bleriot, Antoinette, Wright, Voisin, and R.E.P. aeroplanes, and dirigibles of the Astra, Lebaudy and Zodiac types, as well as various motors specially adapted for flying machines. In this connection special illustrated prominence is given to the Wolseley 8-cyl. V motor, and the prices quoted for the various aeroplanes are given either without motor, with ordinary motor, or with Wolseley motor, a striking compliment to the British product. The catalogue also contains particulars of hangars of various sizes, and prices of many accessories used by aviators.

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Flying at the Antarctic.

IN view of the several proposals with regard to the use of airships and aeroplanes in connection with the exploration of Polar regions, it is interesting to note that in the course of his remarks at the R.A.C. recently anent his experiences in the Antarctic seas, Sir E. H. Shackleton, C.V.O., explained that it was almost impossible for any work to be done by flyers in the Far South regions. There was always a very strong wind blowing across the plateau, so that aeroplanes were out of the question, while balloons would be of no use, as at a height of 700 feet the gas would contract, and the valve once opened would not again close properly. Thus, Antarctic research was narrowed down to a question of men, dogs, and motor cars.

AMATEUR NOTES, SUGGESTIONS, QUERIES AND COMMENTS.

CONSTRUCTIONAL DETAILS.

THE writer would like to anticipate criticism by stating that he is in no way connected with aeroplane work, has never built a full-sized machine or flown in one, and only relies on his knowledge as an engineer and that instinct which an engineering training and a fair memory give to an enthusiast.

The object of venturing to appear in print is the belief that aeroplane work will follow on similar lines as automobile engineering did years ago. The discussion in the papers then did more towards furthering the general knowledge of motors than all racing by crack men, exhibitions and other popular attractions. It is with a view of inaugurating a discussion on similar lines, which from week to week will make one hunger for one's copy to see what the other man has to say, that the following remarks are put forward on machines heavier than air.

Frame Constructions.—Since the sail aera per pound of weight to be supported is relatively large, about $\frac{1}{2}$ sq. ft. per lb., the supporting frame assumes large proportions, and the demands of lightness with stiffness are difficult to meet both by design and selection of material.

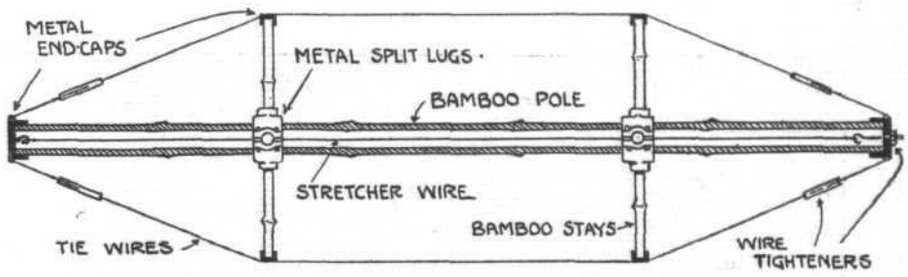
From an engineer's point of view all frame constructions are built up from two kinds of parts. Parts resisting pull (tension-members) and parts resisting push (compression-members). To make tension-members of great strength, combined with lightness, is a comparatively easy matter, since such an excellent material as piano wire is at hand. A wire not thicker than an ordinary piece of string will safely support a ton.

Compression-members, on the other hand, are rather troublesome, since no material combines great stiffness to bending with extreme lightness. Having fixed on the material, and decided on the section to be employed, the designer has no alternative but to decide what is the maximum length that can be relied on to resist bending. This is always a matter of a few feet, six to seven at the utmost. In any case the total length of the member required is usually about four or more times this length. It then becomes necessary to arrange for suitable supports at regular intervals.

As we are considering a main member from which the auxiliary members which go to build up the frame are to derive their support, it is clear that any points on the main member that require staying must be stayed from other points on the member itself. A construction on this principle is known as a box girder. For main compression-members the task then is to design the stiffest and at the same time lightest box girder. The material itself, and the section in which it is employed, should be the one which allows of putting the points where staying becomes necessary as far apart as possible.

As regards the section, there is little doubt that the tube is the most suitable one when stiffness with lightness are aimed at. Wood is not very suitable in this form, and steel tube is no doubt preferable. One class of wood, however, supplied by nature in tubular form, and combining lightness with great stiffness, so far apparently has escaped the attention it seems to deserve. The writer is referring to bamboo. If the pecularities of this wood are taken into account, and allowed for in the design, it seems that it lends itself to the construction of a very satisfactory box girder combining lightness and great stiffness with freedom from brittleness. The writer has actually experimented in this direction, and produced very satisfactory constructions along the following lines.

A bamboo pole was capped at both ends with metal caps to prevent splitting and provide satisfactory joints to other frame members. These caps were pushed on tight and held in place by a piano wire which, running right through the centre of the pole, ended in a tension screw. At the places where stays were wanted, metal clips made in halves were clamped on to the bamboo. It is seen that these clamps carry four lugs in which



short pieces of bamboo were received. Each of these was again capped at the other end and four piano stretching wires completed the box girder.

Engines.—The first thing that impressed one with being somewhere out of proportion in aeroplane work, was the h.p. apparently deemed necessary to fly. Quite apart from all engineering calculations, it does seem odd that 50-h.p., or even more, should be needed to lift one man (say 150 lbs.) and the machine. M. Bleriot has already halved this figure, and we shall probably get down considerably lower yet. Regarding the types of engines employed, one again cannot help wondering that water-cooled engines should be used. Air-cooled engines give no trouble in motor bicycles, and American experience shows they are also quite satisfactory on cars if a good cooling draught is provided. Now if an engine has a chance to keep cool, it is in an aeroplane, and water-cooling seems only so much extra and unnecessary weight. In at least one engine an attempt has been made to get the necessary cooling, and at the same time the fly-wheel effect, by rotating the cylinders. Neat as the design is, complications are introduced to get reliable carburation and overcome the action of centrifugal force on the valves. With the ordinary air-cooled engine suitably placed, the draught from the propeller should give all the cooling needed, and the propeller itself could readily be adapted to act as a very efficient and at the same time light fly-wheel. It is common engineering knowledge that the fly-wheel effect of any mass is dependent on the weight, the radius at which the mass acts, and the speed with which it revolves. Since the propeller-speed is high and the blades long, it follows that the weights or masses required at the propeller-tops are small for any required fly-wheel effect.

Methods of Propulsion.—The familiarity with propellers and no doubt the great attraction of a straightforward rotary motion, have so far led to the universal

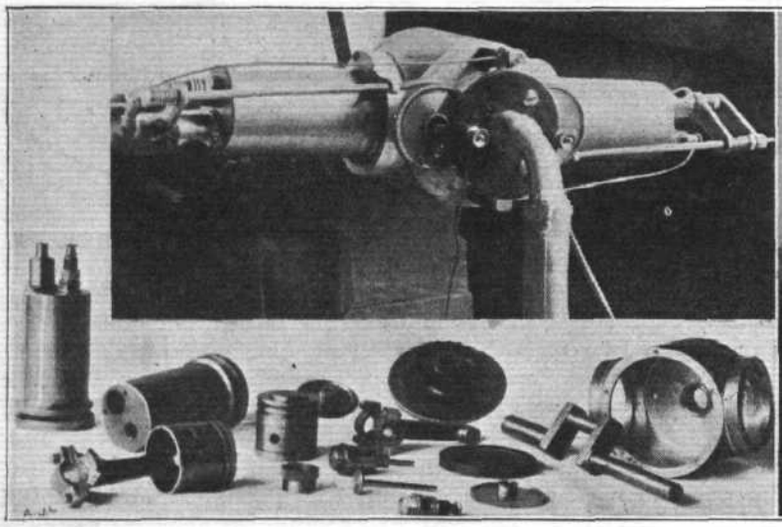
use of propellers as a means of converting the engine power into motion. Yet where low engine weight is so important as in aeronautics it seems doubly important to get all the engine power converted into an effort in the direction in which one wants to move. If investigated on this basis the propeller is found to be wanting. It resembles a man pushing a cart by walking at its side with one hand on it. The wind felt at the side of a revolving propeller is a direct measure of the power employed in other directions than that of travel. At some future date I shall have something to say about the ideal propeller and the motion it requires. Having decided what is wanted, it will next be necessary to see if sound engineering will enable us to realise the ideal conditions, or whether a compromise will have to be effected.

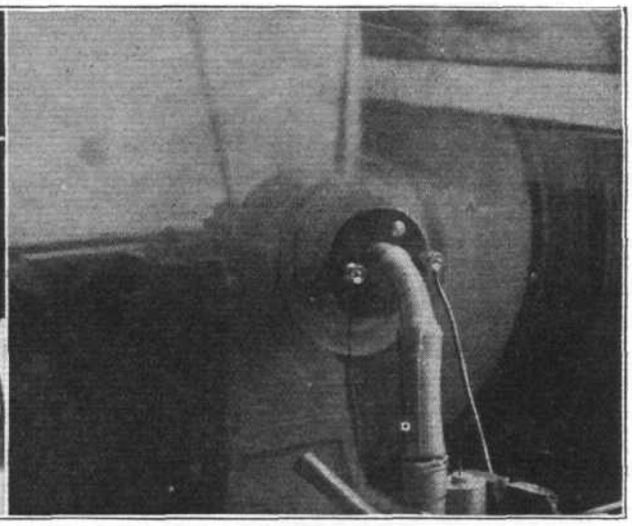
OTAC.

A TWIN-CYLINDER ROTARY ENGINE.

THE 5-H.P. GRANVILLE PETROL MOTOR FOR MODEL FLYERS.

THE accompanying illustrations show one of the special engines of the radial rotary type which are being built by the Granville Motor Co., of Gloucester, under Mr. Scott's patent. Engines of various sizes and different number of cylinders, but all operating on the same principle, with the cylinders and crank-chambers revolving around a stationary crank-shaft, are included in the full list for which the patterns have been made and for which orders are being taken. Our illustrations, however, refer to the smallest of these machines, which is chiefly intended for model work and develops its full power at about 1,600 revs. per min.





In one of these views the engine is seen at rest with the cylinders lying horizontally, and in another view the motor is running, so that only the distributor and the induction-pipe leading up to the carburettor can be seen other than as a blurred image. Supplementing these two views is a group of the various component parts of the engine itself, including the hollow vanadium steel crank-shaft, the crank-case, which is either made of aluminium or magnalium as required, the pistons, with their inter-locking connecting rods that ride upon the same crank-pin, and the chrome steel valves. A special feature of the engine, which is also visible in this view, is the manner in which the cast-steel cylinders are fixed to the crank-case by means of internal locking-rings, and another interesting detail of the design is that forced lubrication is employed, the oil being fed through passage-ways in the crank-shaft. The bore and the stroke of this particular engine are both $2\frac{1}{2}$ ins.

Aeroplanes for Traversing Deserts.

SPEAKING recently upon the results of the Rheims meeting, M. Quinton, President of the Ligue Nationale, predicts a useful future for areoplanes for the purpose of crossing desert country. He instances the journey from Timbuctoo to Colomb Beshar, the terminus of the Oran railway. The distance is 1,000 miles, and at present three months is occupied in the journey. M. Quinton maintains that with an aeroplane capable of going at 40 miles an hour, three days would be sufficient, the actual flying per day being for a period of eight hours. M. Quinton states that the cost per kilom. by aeroplane would work out to about one halfpenny, and suggests that a fare of £3 7*s*. 6*d*. should be charged for the above trip. No difficulty exists in establishing fuel depôts at proper intervals for the aviators.

A German Harbour for Dirigibles.

WITH the object of establishing a harbour for airships, and a flying ground, the Deutsche Flugplatz Gesellschaft has been founded, with its headquarters at Berlin. The flying ground will be in the neighbourhood of the German capital, and will cover an area of about 800 acres.

To Theatre by Aeroplane.

SOME folk avail themselves of every opportunity to keep abreast of the times, and evidently the management of Her Majesty's Theatre, Carlisle, are such, for on their play-bills appears an announcement to the effect that for the convenience of patrons coming from a distance aeroplanes can be stored free of charge.

AERO CLUB OF THE UNITED KINGDOM.

OFFICIAL NOTICES TO MEMBERS.

Committee Meeting.

A MEETING of the Committee was held on Tuesday, the 9th inst., when there were present: Mr. Roger W. Wallace, K.C., in the chair, Mr. Ernest C. Bucknall, Col. J. E. Capper, C.B., R.E., Mr. Martin Dale, Capt. A. H. W. Grubb, D.S.O., R.E., The Earl of Hardwicke, Professor A. K. Huntington, Mr. F. K. McClean, Mr. J. T. C. Moore-Brabazon, Mr. C. F. Pollock, Hon. C. S. Rolls, Mr. J. Lyons Sampson, Mr. Stanley Spooner, and Joint Secretaries Capt. E. Claremont, R.N., and Harold E. Perrin.

New Members.—The following new Members were elected:—

Capt. T. St. John Belbin.
Arthur Vere Bettington.
Egerton Mitford Bettington.
George Frederick Bowyer-Bower.
J. Cadman.
Matthew Edward Clark.
W. J Compton.
G. H. Cox.
Ronald Cunningham.
Baron de Ville.
Mathew Foulds.
Emile Garcke.
C. Hardy.
W. A. Harper.
G. Howard.
Frederic A. Maythorn.
Mrs. Angela Mond.
C. St. John W. Nicholson.
Percy Ogden.
L. Paulhan.
J. F. Ramsden.
W. D. Roberts.
A. M. Robeson.
Douglas N. Russell.
T. Sherratt.
Rev. Sidney Swann.
Lewis Waller.

Doncaster Aviation Meeting.

The Committee of the Aero Club, in fulfilment of the obligations imposed by the International Aeronautical Federation, have suspended MM. Delagrange, Sommer, Le Blon, and Molon, from taking part in any contests held under the Federation rules until January 1st, 1910. On the assurance of Mr. Cody that he did not take part in any competitions at Doncaster, no penalty in his case has been imposed.

Secretaries.

Owing to the very large and increasing work at the Aero Club, the Committee have appointed Capt. E. Claremont, R.N., as joint Secretary to assist Mr. H. E. Perrin.

One Mile Flight at Shellbeach.

The Hon. C. S. Rolls accomplished a flight of over one mile at Shellbeach on November 4th under official observation, and has been awarded the £50 prize given by the Aero Club.

Record for High Flight.

At Sandown Park on Saturday, November 6th, M. Louis Paulhan accomplished a height of 977 feet, which constitutes a record. The flight was observed by the Aero Club officials, assisted by Capt. Carden and Lieut. Waterlow, of the Royal Engineers.

Annual Dinner.

The annual dinner will take place early in December, and the exact date and place will be announced in next week's notices.

Shellbeach Flying Ground.

Members visiting the flying ground are requested to have with them their membership cards, as strict instructions have been given to admit only members to the flying ground.

Members are also reminded that access to the aeroplane sheds can only be obtained with the written consent of the owners of the flying machines.

Telephone.—The telephone has now been installed. Members wishing to telephone there are requested to ask for 5B Minster-on-Sea, Isle of Sheppey. The telephone is installed in the Club House, and also to the sheds on the grounds.

Erection of Sheds.—Members wishing to erect sheds at Shellbeach are requested to apply to the Secretary, who will supply all information.

Railway Arrangements.—The following reduced fares have been arranged with the railway company for members visiting Shellbeach:—

1st Class return, 8*s.*; 2nd Class return, 6*s.* 6*d.*; 3rd Class return, 5*s.*

Tickets available for one month from date of issue.

Members desiring to avail themselves of these reduced fares are required to produce vouchers at the booking offices. Vouchers can be obtained from the Secretary of the Aero Club. Trains leave Victoria, Holborn, or St. Paul's.

For the convenience of Members, the best train is the 9·45 a.m. from Victoria, arriving at Queenborough 10.55. At Queenborough change to the Sheppey Light Railway for Leysdown (Shellbeach), which is ¾-mile from the flying ground.

HAROLD E. PERRIN, Secretary.

The Aero Club of the United Kingdom,
166, Piccadilly, W.

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PROGRESS OF FLIGHT ABOUT THE COUNTRY.

(NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary.)

Coventry Model Engineers' Society (21, FRIARS ROAD).

THIS Society has decided to form a section, to be devoted to the study of model flying machines. This will be run in conjunction with the present Society, and the subscription will entitle members to the benefits of either section. The meetings will also be held on the same evenings as at present. Should any of our readers wish for further particulars, the secretary (Mr. R. H. Sturgess), will be pleased to forward same on receipt of name and address. The Society held an exhibition of models, &c., on Wednesday last, at the Mayor's Parlour Café, Broadgate.

Glasgow Model Aero Club (321, DUMBARTON ROAD, PARTICK).

A LARGE and representative meeting of the above Club was held in Duncan's Temperance Hotel, Union Street, Glasgow, on Friday evening, 5th inst., when the constitutional rules and regulations for the management of the Club were submitted and passed.

A letter was read from a local gentleman offering a suitable flying ground for competitions or tests on models. It was decided to accept this generous offer.

It is gratifying to notice the interest that is being evinced in the movement, and the satisfactory increase of membership since the inauguration.

Hartlepool Aero Club.

FOLLOWING on the preliminary meeting held a week or so ago, the first general meeting of this Club was held at the Black Lion Hotel, West Hartlepool, on Tuesday night. Mr. A. Barrett was elected President, Mr. H. F. Friedericks, M.I.C.E., Vice-President, and Mr. T. Beckett, Hon. Secretary. It was decided to proceed with the formation of a library of aeronautical works, and to prepare a scheme for the construction of a glider, which will be discussed at the next meeting. Messrs. A. Barrett, B. T. Hart, and W. T. Walton, jun., were elected as the three delegates to attend the conference of provincial clubs on the 17th inst.

Hull and East Riding Aero Club (57, BEVERLEY ROAD).

A MEETING of well-known gentlemen of Hull and district was held on the 2nd inst., at the Station Hotel, Hull, when an aero club for Hull and East Riding was formed.

Major Campbell Thompson was elected president, and Mr. George Wade secretary.

Between 30 and 40 gentlemen, the majority of whom are motorists, were in attendance, and a committee was appointed to form an association and to draw up rules.

The movement is likely to advance quickly, as there was a good deal of enthusiasm displayed by those present at the meeting.

The secretary announced that the use of land near Hull for aviation purposes had been offered.

The headquarters are at the Station Hotel, and the subscription will be one guinea per annum.

Irish Aero Club (34, DAWSON STREET, DUBLIN).

ON November 5th, a large gathering of prominent men interested in aviation assembled at the club-house of the Irish A.C. to consider the question of forming an Irish Aero Club. Sir W. G. D. Goff was elected to the Chair, and gave an address on the objects of the proposed club. Sir Henry Grattan-Bellew also spoke and said he thought the best way to encourage the movement was to form a club where people could exchange ideas and get assistance in carry-

ing out ideas which otherwise might be allowed to drop and never be heard of. He moved :—

"That an Irish club to be called the Irish Aero Club be formed, for the encouragement and support of aerial navigation."

This was seconded by Mr. J. C. Percy, and passed unanimously. Mr. E. White then proposed and Mr. Ferguson seconded :—

"That it be referred to the Committee of the Irish Automobile Club to select from the members of those interested in aviation a committee of not less than 10 nor more than 20, to act as the first committee of the Irish Aero Club."

This was passed, and on the motion of Mr. J. C. Percy, the Hon. Secretary of the Irish A.C. (Mr. E. White) was elected Hon. Secretary, *pro. tem.*, and Sir W. G. D. Goff was appointed President.

Mr. Percy announced that he had been in communication with M. Paulhan with regard to his giving an exhibition near Dublin.

Kite-Flying Association (27, VICTORY ROAD, WIMBLEDON).

AN exhibition of kite flying will be held on Wimbledon Common, on Saturday afternoon, November 20th (weather permitting), to give a practical demonstration of the two uses to which kites can be put during military or scouting operations. This demonstration has been specially arranged for the benefit of the Scoutmasters and boys of the Boy Scouts.

Scoutmaster F. T. Pringuer will show his method of signalling by the Morse code, with the aid of a kite.

The device which will be used is his own idea, and should prove of great use to scouts during field operations.

W. Jones, of Gamage's, Ltd., will show the Gamage Patent Camera apparatus, by which means very little skill is required, and the actual exposure (which is instantaneous) being quite automatic.

The hon. secretary will be pleased to receive applications for membership, and trusts that those interested in the Boy Scouts will send donations towards a prize fund for future competitions for the lads.

Manchester Aero Club (9, ALBERT SQUARE, MANCHESTER).

AT a meeting of the Club, held on the 31st ult., a resolution was passed to the following effect :—

"That all provincial aero clubs should form a temporary federation for the sole object of safeguarding their common interests in forming or acknowledging a national governing body for aero matters, and that the Secretary be instructed to get into touch with all the provincial clubs, to impress upon them that this is not done with the idea of assuming any authority, or with any antagonistic attitude towards any existing institution."

It was felt that such a federation would assist the provincial clubs in securing proper recognition upon a National Council.

At the first of the series of lectures given at the Manchester School of Technology on the 2nd inst., by M. L. Blin Desbleds, there was a very good attendance, and the interesting address was followed very attentively.

Midland Aero Club (THE BUNGALOW, STECHFORD, BIRMINGHAM).

AT a Council meeting in Birmingham on the 3rd inst., the offer submitted by Sir Richard Pagett, and the question of an early aviation meeting at Wolverhampton, were fully gone into. The question of a suitable emblem for the Club's badge was also considered, and the design submitted by Messrs. Elkington and Co. was accepted. The question of the admission of lady members to the Club was considered, and it was decided that the subscription for the first 250 lady members should be 10*s.* 6*d.* per annum. It was also decided that after the first 350 foundation members of the Club an entrance fee should be charged. The arrangements for the model flying contest on Saturday, November 13th, were also completed.

Sheffield and District Aero Club (36, COLVER ROAD).

MR. C. WIGHTMAN, who has been appointed Hon. Secretary of the above Club, writes to point out that the meeting which was reported in our last issue was not a public one, but private. Since then the Club has been formed and we shall hope to chronicle its active work in future issues. It already has a good membership roll, and all who wish to join are asked to communicate with the Hon. Sec. as above.

S.W. England Aeronautical Soc. (51, ST. LEONARD'S RD., E. SHEEN)

A GENERAL meeting will take place next Sunday, November 14th, at the Society's headquarters, Down Place, King Street, Hammersmith, members to assemble for tea at 4 p.m., meeting to be held directly afterwards.

Three delegates are to be elected to attend the meetings organised by the Midland Aero Club for next week to discuss the formation of a National Council.

It is hoped that all those interested or desirous of becoming members will be present both at tea and at the meeting afterwards.

HIGH FLYING AT SANDOWN PARK.

OF the two days which were spent by M. Paulhan on the Sandown Park racecourse, his achievements on Saturday last quite put in the shade all his other performances in this country. In the morning he made a trial circuit just to see that the machine was in working order, and then set off to create a new British record for a circular mile. Three rounds of the course were made in 2 mins. 6⅕ secs., 2 mins. ⅕ sec., and 2 mins. 7⅖ secs. respectively, the second being now the British record. Without coming down M. Paulhan continued flying, but did not keep to the course, flying higher and higher until an altitude of about 400 feet had been reached. Suddenly he stopped the engine and swooped down with, to the uninitiated, awful suddenness, but when within a short distance of the earth he restarted the motor and the aeroplane once more rose gracefully. Eventually he came down after 17 mins. 15 secs. Lunch disposed of, he started upon his record making flight, during which he attained a height of 977 feet, as certified by Capt. Carden and Lieut. Waterlow, of the Royal Engineers, as official observers for the Aero Club, who measured the height of every round by means of a theodolite. The flight lasted 15 mins. 55 secs., and as the height reached is the world's best yet officially recorded—those of Count Lambert and Orville Wright not having been officially observed—it is claimed as a world's record. He again glided down at an alarming rate to within a few feet of the ground, and then re-starting his engine rose for a little way again before finally settling to earth. When he did come down he was surrounded by the crowd, and taking his seat in a motor car was driven round the course to the accompaniment of continual cheering.

On the previous day, Friday, a large number of people unfortunately deferred their journey to the racecourse in view of the thick fog in town, but at the racecourse all was bright and clear. Several flights were made by Paulhan previous to lunch, and immediately afterwards he rose to a height of 340 feet. In starting for the next flight a slight mishap occurred. One of the wire stays came adrift, and becoming entangled with the propeller, damaged it considerably. Fortunately a spare propeller was handy, and this was soon fitted, and shortly after four Paulhan was again in the air, and rising rapidly was before very long soaring at a height of 500 feet. Tiring of this, he shut off the engine and planed down with extraordinary rapidity, righting the machine just before reaching the ground and skimming along the grass for a few yards. Among the many distinguished persons who witnessed this daring exhibition were Lord Roberts and Lord Charles Beresford.

FOR such remarkable flights as that of Count Lambert over the Eiffel Tower in Paris, the importance of having materials of the first quality in aeronautical machines cannot be over-estimated. The machine of the Wright type used by Count Lambert had wings covered with the well-known Continental aeroplane fabric, which is used in the construction of many of the most successful machines.

MESSRS. G. G. TURRI AND CO., of 497-499, Collins Street, Melbourne, inform us that they have taken up for Australia and New Zealand the supply of all kinds of aeronautical goods (dirigible balloons, aeroplanes, models, and material, including engines and spare parts). They are prepared to accept agencies from American and European firms who desire to be represented.

Bosch Magneto Extensions.—In view of the continually increasing demand for the world-famous products of the Bosch Magneto Co., Ltd., it has been found necessary to increase the capital of the Company from £15,000 to £50,000. The business has so increased that they have practically outgrown their present premises at 23, Store Street, W.C., and intend seeking further space for development. An announcement which will be of great interest to the whole of the trade with regard to this Company's policy will be made early in the New Year.

"Shell" Spirit for Flyers.—Most of the prize-winners at Blackpool used Shell motor spirit during their flights. Among them may be noted Farman, who made the longest flight, and who has since written to say that he found "Shell spirit really splendid," and only used that brand during his English flights. Rougier and Paulhan also used Shell spirit.

AVIATION NOTES OF THE WEEK.

Hon. C. S. Rolls Wins Another Prize.

FOLLOWING up his previous success, the Hon. C. S. Rolls succeeded on Thursday of last week in winning the first of the Aero Club's £50 prizes for a circular mile flight. He circled round the sheds at Shellbeach, and eventually the Wright flyer reached a height of 60 feet, the highest yet seen on the Aero Club's ground.

Mr. Moore-Brabazon Flies Across Country.

GETTING more and more accustomed to his Short machine, Mr. Moore-Brabazon is now gradually lengthening his flights, and on the 4th inst. had an aerial excursion of about 3½ miles over the country in the neighbourhood of the Shellbeach aerodrome, returning quite easily to within a few yards of his starting point. Last week, too, Mr. Moore-Brabazon took a passenger, in the shape of a little pig, for a short trip on his machine, just to show that it was not impossible for pigs to fly, in spite of the old proverb. That pig has now been named Icarus II, and it is said to have "saved its bacon." On account of its having been the first pig to fly, its owner has decided to bring it up as a pet, and it will therefore not share the fate of its six brothers.

Another British Flyer.

MR. A. OGILVIE, whose Wright glider was fully illustrated and described in our issues of September 18th and 25th last, has at last obtained delivery of his full-sized Wright flyer, and has met with considerable success with it so far, on Wednesday flying for nine minutes at Camber Sands, near Rye.

The Humphreys Monoplane.

MR. JACK HUMPHREYS has now transferred his monoplane from the unsuitable ground at Wyvenhoe to Colchester, where he has received permission to fly over the cavalry parade ground adjoining Reed Hall. Mr. Humphreys has now installed a 50–60 h.p. Green engine, and he hopes to soon make another attempt to secure some prizes. On Thursday of last week he intended to make a trial, but the propeller broke, rendering an adjournment necessary.

Henry Farman After Height Honours.

LAST week Mr. Henry Farman sent in his entry for the Lazare Weiller Prize, which will be awarded to the aviator who beats Wilbur Wright's record of 110 metres. Mr. Farman intended to try for this prize at Chalons on Sunday last, but a slight accident to his machine caused the postponement of the attempt. It was at the end of a second flight with M. van der Born that the machine suddenly glided down from a height of 20 metres, and before the descent could be properly checked the skid had come into sharp contact with the earth. That the damage was not serious, however, was shown by the fact that it was repaired during the evening, and Farman was ready to fly again on the following day.

M. Levavasseur Retires from Antoinette Co.

THE retirement of M. Levavasseur, the eminent engineer and designer of the Antoinette engine and flyer—with which Mr. Latham has made history—from the French Antoinette Company, is announced. It is stated that he will join hands with M. Jules Gastambide, and exploit the famous monoplane in Great Britain.

Prince Bolotoff still Experimenting.

ALTHOUGH up to the present he has not met with any very great success, Prince Bolotoff still retains his faith in his triplane. On the 29th ult. he commenced a new series of trials at Chalons Camp, but the first attempt did not give any promise of success.

Engelhardt Flies Nearly Two Hours.

AT Bornstedt, on the 5th inst., Lieut. Engelhardt, on the Wright flyer belonging to the German Army, flew for 1 hour 53 minutes, until, in fact, the petrol supply gave out.

Another German Flyer.

FOLLOWING on the successful flying of Herr Grade, Lieut. Gohler, a young officer in the 6th Infantry Regiment, stationed at Muhlheim, near Cologne, has been carrying out some short flights on a monoplane of his own invention. Last week he succeeded in flying round the camp for four minutes, the trial being witnessed by a number of other officers of the regiment, and it was only brought to a conclusion by trouble with the motor.

Flying in Canada.

AFTER some weeks' delay, due to the accident to their aeroplane, "Baddeck II," Messrs. McCurdy and Baldwin have recommenced their flights, and on the 1st inst. Mr. McCurdy flew a distance of about 15 miles in 21 mins. at Petewawa Camp, by Ottawa.

Orville Wright Home Again.

ON the 4th inst., Orville Wright and his sister arrived in New York on the White Star liner "Adriatic." It is announced that the Wright Brothers have under consideration an attempt to make, before the end of the year, a determined effort to keep the Michelin Cup for a second year.

Prizes at Rio de Janeiro.

AT the Hygiene Exhibition recently held at Rio de Janeiro, Mr. Godet made some experiments with a flying machine, and these fired some of the

At the Watford Engineering Works work is very brisk manufacturing Beedle aeroplane propellers. The above is the first sent abroad for actual use. It is 6 ft. 9½ ins. in diameter, and was made for M. Bleriot. By the side of the propeller, giving a good idea of its size, is Mr. Beedle, the inventor.

enthusiastic sportsmen to think about organising a meeting. It is proposed to offer a prize value £6,400 to be given to the first aviator who, starting from the grounds of the Exhibition, flies round the Monroe Palace and returns to his starting point. The distance is a little under 4½ miles, most of which is over the sea.

New Recruits and Trial Flights.

ONE of the most recent *débutants* at Chalons is Mr. A. Rawlinson, well known in connection with Darracq cars in this country, and who is arranging for the supply of Farman machines in Great Britain. His mount is a Farman fitted with a 100-h.p. Darracq engine. At his first attempt at flight Mr. Rawlinson covered a distance between 600 and 700 metres, and is making good progress.

Among other new flyers who have been practising at Chalons with more or less success during the past few days are Keller on an Antoinette, Chateau on the new Voisin, MacArdle on a Bleriot, the Baronne de la Roche, and the Voisin pupils, Bellot, Pauwelo, Nieuport and Muisgan. Farman and Latham have also been trying their new flyers. At Issy, M. Marquezy succeeded in getting the C.A.M. monoplane to rise for a few seconds on the 4th inst., while several purchasers of Bleriot machines are trying their wings, including MM. Gilbert and Taurin.

St. Cloud has a new aviator, M. Piau by name, who, on a monoplane of his own design, flew a distance of 400 metres along the racecourse on the morning of the 6th inst. Unfortunately M. Piau could not control the machine, and the good start was ended by charging into the grand stands, but the only damage was the slight buckling of one wing. At Port Aviation, M. Gaubert has been practising with a Wright flyer, but without using the starting derrick, meeting with varying success. He is training with a view to taking the place of instructor to the Societe Ariel for their French-built Wright machine, and on the 3rd inst. he flew for a kilometre. Others who have been seen at the Juvisy Aerodrome are Koechlin, who, on the 8th, flew one and a half times round the course on his monoplane, and Cotain and Florency, who have been using a biplane, and have several times flown round the course.

More Challenges.

"STILL in the pages of enterprising FLIGHT the war of the propellers goes on. To the unconcealed joy of one contributor at any rate, the shouts of the combatants are to be heard no longer. The Editor is right; he has been more than patient, too. Now Messrs. X and Y must fight out the questions and problems at stake through the medium of the advertising columns, where they can be as impressive and bellicose as they like at the customary rates."—*John Bull.*

What the Flight Meeting Meant for Blackpool.

SOME idea of the benefit accruing to Blackpool generally from the aviation meeting may be gathered from the announcement at a meeting of the Blackpool Town Council last week by Alderman Brodie, Chairman of the Tramways Committee, that the receipts of the Corporation tramways during the flying week showed an increase of £2,600 over the corresponding week last year.

There should not be much trouble under the circumstances in relieving at least the smaller guarantors to the fund, in regard to the small deficiency of expenses over gate money receipt.

AIRSHIP NEWS.

Paris–London Airship.

AT a meeting of the Parliamentary Aerial Defence Committee, on the 4th inst., it was reported that the construction of the Clement-Bayard airship was then almost completed, and that her outdoor trials would commence about the 21st inst. It is reckoned that the preliminary trials will last about three weeks, and then, at the first favourable opportunity, the journey to London will be attempted. At first it was thought that twelve passengers might be carried, but it is now certain that only eight will make the cross-Channel passage. These will be M. Clement and his three assistants, Mr. Arthur Du Cros, M.P., who is Secretary to the Parliamentary Aerial Defence Committee, and is arranging the trip, Lieut. Usborne, R.N., who is superintending the construction of the rigid dirigible for the Admiralty, Col. Capper, who will represent the War Office, and a representative of the *Daily Mail.*

The delay in completing the airship has been caused in the first place by the strikes in France, and secondly by a change in construction in view of the disaster to the "Republique." In order to guard against such accidents, the balloon envelope of the "Clement-Bayard" has been divided up into compartments, while wooden propellers have been substituted for metal ones.

Immediately on its arrival in Great Britain, it is stated the airship will be inspected by H.M. the King, and will afterwards undergo certain tests laid down by the War Office.

Belgian Airship Competitions.

THE Belgian Aero Club are considering the question of organising a series of three competitions for dirigible balloons, the prizes to amount to 125,000 francs, and it is stated that already six entries have been obtained. The first will be for vessels of more than 1,500 cubic metres capacity, which will be required to cover the 100 kilom. circuit from Brussels to Antwerp at least three times, while in the second competition, for dirigibles below 1,500 cubic metres capacity, the circuit will be from Brussels to Louvain, a distance of 50 kiloms. The third event will be known as the Circuit Nationale, the course being from Brussels to Ghent, and then on to Antwerp, Liege, Namur, and so back to Brussels, a distance of 335 kiloms.

"Espana" Comes to Grief.

FOLLOWING immediately on the successful trial chronicled in our last issue, MM. Surcouf and Kapferer, the constructors of the "Espana," decided to submit her to a long trial, comprising a night run. With the exception of a strong easterly breeze, the weather conditions were favourable when the airship rose at Meaux on November 5th, just before half-past two. It was at once headed in a westerly direction, and kept going on steadily for a little over five hours. Then the occupants of the *nacelle* felt a tremor run along their frail craft, which told them that something had gone wrong, and the propeller stopping, placed the airship in the position of an ordinary free balloon. Eventually the dirigible was hauled down at Fremainville, and there the gas-bag was deflated and packed up for return to the Astra works. Although the details as to the cause of the accident are not clear, it would appear to be due to the breaking of one of the ropes carrying the forward end of the hull, which was then twisted out of shape, and so deranged the propelling mechanism.

German Airship Manœuvres.

DURING the latter end of last week the four German military dirigibles continued their manœuvres at Cologne, and on the 4th inst. a series of altitude trials were carried out. "Parseval III" rose to a height of 800 metres, while the "Gross II" and "Parseval I" went up as high as 1,200 metres; but the "Zeppelin II" was unable to take part, owing to some motor defect. Just before midnight on Tuesday week the airships, with the exception of "Parseval I," set out for a night cruise, and carried out a series of imaginary attacks on the fortress of Coblentz. They all remained in the air for the stipulated time of eight hours. On Saturday the manœuvres came to an end, when the four airships sailed in procession over the city, passing round the double tower of the famous Cathedral.

Armament For and Against Dirigibles.

FROM Austria comes a little information regarding two inventions which are at present receiving the attention of the Ministry of War of that country. One, the idea of Louis Bertuch, is for a torpedo, which could be fired from the ordinary Army rifle and yet would effectively disable the largest airships at a height of 1,000 feet. The second idea, evolved by an engineer named Gratz, consists of a projectile which could be discharged from an altitude of more than 1,400 feet from a dirigible of any size.

An American Balloon Record.

IN connection with the "Centennial" Races held at St. Louis, Missouri, on October 4th, 1909, Mr. Clifford B. Harman, an Ae.C.A. pilot, in the balloon "New York" (80,000 c.f.) set up a new American endurance record of 48 hours. The balloon, which was built of vulcanized rubber material made in America, left the Aero Club Park at St. Louis at 5.15 p.m. on October 4th, and landed at 5.41 p.m. on October 6th at Edina, Missouri. The distance between these points was 150 miles, but a much greater distance was really traversed, as the winds were extremely variable, and the balloon kept travelling in a circuitous direction. The highest altitude reached was 24,200 ft., and the temperature varied from 90° F. to 39° F.

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CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

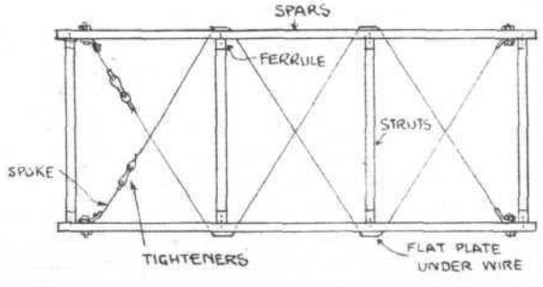
WIRE BRACING.

To the Editor of FLIGHT.

SIR,—I have no doubt that a number of readers of FLIGHT who are building aeroplanes have a great difficulty in bracing up their machines. I am building a biplane, and am using the system of which I have enclosed a rough sketch, and find it works most satisfactorily either for the planes or outriggers or any other part. It

Fig. 1

Fig 2



is what I call continuous bracing; the wire is fitted with a bolt at one end, goes under one strut and over the other, and is pulled taut with an adjuster made of a spoke and nipple and a bent plate.

This makes a good sound job, and I trust it may be of some use to the readers of FLIGHT.

Yours truly,

Wandsworth. WALTER YEATMAN.

A QUESTION OF WEIGHT.

To the Editor of FLIGHT.

SIR,—I am making a model monoplane with a total area of 7½ sq. ft. Will you or one of your readers of your excellent paper let me know what the maximum weight of the model should be with engine complete, *i.e.*, to obtain good results; also what h.p. and dimensions of propellers. Wishing your paper every success,

Yours faithfully,

M. M. W.

A DEFINITION OF "V^2."

To the Editor of FLIGHT.

SIR,—Referring to the account of the Wright Bros.' early experiences (by Wilbur Wright), I note that the curve for the decks is given as having been originated by them, whereas I have always been under the impression that it was the strict and ideal Lilienthal curve.

Did then Lilienthal use a plane with just an ordinary semi-circular curve?

I shall esteem it a favour if you can enlighten me on this point, and give me a definition of V^2 at the same time, as I continually stumble upon it in the columns of your valuable paper.

Yours faithfully,

Chiswick. WALTER E. FOX.

[The tables compiled by Lilienthal relating to the lift of aerofoils were based on his experiments with cambered surfaces having the curvature of an arc of a circle. There is not, so far as we know, any record of Lilienthal having moved the maximum versine of the camber nearer the leading edge, nor have we found any record of any experimenter having done so prior to the Brothers Wright.

The symbol V^2, which is so commonly used in articles on flight, should be read "square of the speed." It implies a value obtained by multiplying the speed by itself. Thus, if the speed is actually 10 miles an hour, then V^2 equals 100. Air resistance is proportional to V^2. That is to say, the ratio of two resistances, one being at 10 miles an hour and the other at 20 miles an hour, will be represented, not by the figures 10 and 20 themselves, but by their squares, which are 100 and 400 respectively. It will be noticed that the greater resistance is thereby four times instead of only twice as great as the smaller.—ED.]

BROOKLANDS AND FLIGHT.

To the Editor of FLIGHT.

SIR,—Having in view the great interest which the original use of Brooklands as an aviation ground has aroused, it might interest you to see and possibly to publish the enclosed letter, which I have forwarded to the many applicants we have had for sheds and accommodation at Brooklands.

Yours faithfully,

F. LINDSAY LLOYD, Clerk of the Course.

[Enclosure.]

"With reference to your application for facilities for exercising an aeroplane at Brooklands, I beg to inform you that we are proposing to proceed on the following lines:—

"We will erect and maintain a suitable shed for each tenant, and let same for the rents mentioned below. For these payments the

tenants will have the exclusive occupation of the sheds, and the right to use the interior of the track as an aviation ground upon all occasions except when the track is required for race meetings, or when it would be, in our opinion, undesirable to have both aviation and motoring proceeding at the same time.

"Aviators will have the right to use the ground already specially levelled and prepared, and to pass over the other portions inside the track which are cleared, and over which it is intended by degrees to extend the levelling and smoothing.

"The provision of workshops and preparing works for tenants will be a matter for consideration, and proposals in regard to this will be entertained.

"For the rent of each shed, and the facilities above described, each tenant will be charged either—

"1. £100 per annum, payable in advance on signing an agreement; or

"2. £10 a month, payable monthly in advance for an agreement of not less than six months' duration.

"The construction of sheds is being proceeded with, and three sheds are expected to be ready in a fortnight, but other sheds will be built within four weeks of arrangements being made with intending tenants, and preference will be given in the order of application.

"The satisfactory experience of the last few days, and M. Paulhan's expression of opinion on the subject, show that the Brooklands ground, as at present laid out, is eminently suitable for aviation, and that the improvements now being made will render it still more valuable for this purpose.

"I shall be glad to hear from you at your earliest convenience whether you wish to become a tenant on the terms mentioned above."

PROPELLERS WANTED.

To the Editor of FLIGHT.

SIR,—Can you tell me whether it is possible to obtain a pair of propellers, one to be used above the other, 8½ ft. in diameter, revolving in opposite directions, for use in a helicopter, that will develop enough thrust to raise a weight of 675 lbs. with a 60-h.p. motor, r.p.m. 1,200. The propellers are to be encased in a cylinder open at both ends.

Please print this inquiry, as I am one of your American subscribers.

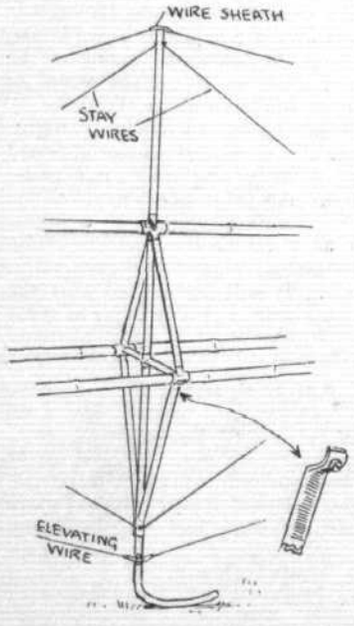
Very truly yours,

250, Vance Avenue,
Memphis, Tenn., U.S.A. E. F. STEPHENSON.

A SANTOS DUMONT DETAIL.

To the Editor of FLIGHT.

SIR,—I am making a one-sixth scale model of the "Demoiselle," and everything is clear to me from your excellent details and photographs except one point, which I should be much obliged if you could explain to me by means of a short description or rough pencil sketch, viz., the position and fixing method of the vertical member that controls the elevation of the tail. It appears that there are oval struts just about where it should come, and it seems to me that it should be split to clear the top bamboo of frame. I should think it ought to be pivoted on the same horizontal line as joint of tail (elevator part), although from diagrams it appears to be pivoted level with bottom bamboos of frame, hence, perhaps, the use of the spiral spring. However, this is conjecture, and you probably know, so I thank you in anticipation.



Yours faithfully,

T. T. SALTER.

West Kensington.

[The above sketch which we have prepared will perhaps make the constructional detail referred to in the above letter clear to our correspondent. It should be mentioned that the principal vertical member in the diamond frame there shown is an oval sectioned steel tube, and extends from the skid below to the upper joint in the frame. The short mast which projects above this joint is a separate member.—ED.]

"PITCH AND TORQUE."

To the Editor of FLIGHT.

SIR,—I am anxious to find the speed of a model aeroplane, but do not understand what is meant by the "pitch" of a screw; also what is meant by "torque."

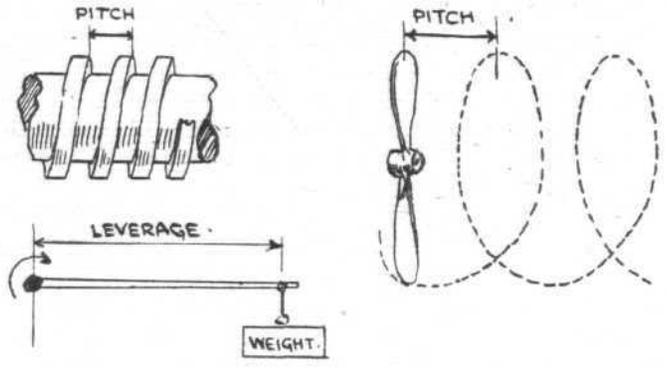
Could you please inform me as to this?

Thanking you in anticipation.

Yours faithfully,

Sutton Coldfield. FREDK. C. HARPUR.

[The pitch of a propeller is the amount which it would travel forward in one revolution if it were moving in a solid medium incapable of slip. In other words it is equivalent to the pitch of a steel screw, which is the measurement along the axis of the distance between adjacent convolutions of the same thread, measured from apex to apex. In actual practice an aerial propeller imparts a sternward velocity to the air in which it works, and consequently the speed of the machine per revolution of the propeller is less than the pitch of the screw by an amount equal to the slip.



TORQUE = WEIGHT × LEVERAGE

Torque is a term defining a force which produces twist. It is pressure or weight acting through a leverage, and is thus a compound unit capable of being expressed in lb. feet or lb. inches, according to the dimensions most convenient to the work. If the power transmitted by a shaft be resolved into the work done per revolution, that value divided by 2π will give the torque on the shaft. The torque is a measure of the stress imposed, and the strength of a solid circular-section shaft is proportional to the cube of its diameter. Hence, D^3 multiplied by a constant appropriate to the material employed must always be greater than the torque to which it, the shaft, is subjected.—ED.]

AERO MOTORS.

To the Editor of FLIGHT.

SIR,—Judging from the report of the recent Paris Show, the majority of aero motors in France—as elsewhere—appear to be purely car motors, as, although of lighter weight, there is nothing to show that they are specially adapted for aero work. The few rotary-reciprocating engines certainly are a departure from stereotyped design, but I have long wondered why no firm has yet produced an aero engine with crank-shaft and pistons as in a car motor, but designed to run in the inverted position, which in my view is the better way, and particularly suited to monoplanes, in nearly all of which the pilot is on a level with the carburettor, so that, if it fires, the flames stream back on to the pilot—as happened at Rheims to M. Bleriot, who was flying low at the time or the result must have been more serious.

Inverting the engine would bring the carburettor below the aviator, and, incidentally, would lower the centre of gravity. It also admits of a very compact arrangement of the tanks and radiator owing to the low level of the carburettor and water-jacket, into which the cooled water would enter close to the valves.

In such an engine the cylinders would project into the crank-case to keep the oil drainings out of the cylinders, while the oil-sump could conveniently be formed in the gear end of the crank-chamber, the cover of which may be of light sheet material secured after the manner of a car bonnet, and as readily opened, giving instant access to the big-ends, main bearings, oil-pump, &c.

There need be no lubrication trouble, as witness the success of the Gnome rotary-reciprocating motor, in which all sorts of lubrication troubles were prophesied by the "experts." If, however, it be found necessary to cover the cylinder ends in order to prevent over lubrication, a very simple form of cover could be made of a thin rectangular sheet of metal, bent to form an arched roof over the cylinders—as high as the big-ends would permit—and secured to the

sides or ends of the compartment, the edges of the connecting-rod slots being slightly turned up. In any case over lubrication could not well cause a deposit, as, with valves in the cylinder-head, the cylinder would be self securing. Neither could a broken valve fall into the cylinder.

Most of these points would also apply to V engines.

I may add that this idea was included in the design of a novel aeroplane, which circumstances have prevented my constructing, and in offering the suggestion I venture to predict that the first producer of an inverted aero motor will have many imitators.

Yours faithfully,
HOLTEC.

AN AMATEUR-BUILT MODEL CLASS WANTED.

To the Editor of FLIGHT.

SIR,—Kindly allow me through your valuable paper to draw attention to the model flying competitions in several parts of the country. Being interested in model making and flying, I took the opportunity of visiting a model competition held at Woolton, near Liverpool, on October 30th, and to my sorrow I noticed that the prizes went to models made by large manufacturing firms. Now I think the majority of your readers will agree with me when I say that if bought models are going to win all the prizes, it is going to take all interest out of private model making for competition, for what person will spend his time and waste his brains making a model when he knows that he can purchase a guaranteed flyer for a few shillings? So my opinion is that the sooner the aero clubs and societies throughout the country are brought to see it in this light the better it will be to the interest and advancement of the new science of aviation.

Yours respectfully,
Bootle, Lancs. P. MCKEOWN.

TERMS IN FLIGHT.

To the Editor of FLIGHT.

SIR,—Allow me to suggest that the word "deck" should never be allowed to substitute the word "plane."

Plane is by far the most suitable word for the supporting surface of an aeroplane. Any complexture from the word "plane" should be stamped out forthwith, especially the word "deck," as no doubt before long flying machines will possess "real decks" for the convenience of passengers, although it may be advisable in the first place to allow a certain amount of swinging movement, so that the centre of gravity is in no way interfered with.

I agree with everything your correspondent, Mr. Hammond, puts forward, and the way in which he sticks to common-sense. Regarding your correspondent, "Nil Desperandum," I greatly admire his pluck and enterprise in undertaking to produce complete working drawings of the extremely light and apparently efficient engine, but I think it would be more satisfactory for him if he went further in the matter, and produced a working model. The English financier is to-day a long way off his Continental rival so far as speculation is concerned; in fact, he leaves much to be desired. I have had my experience in the matter, and I should suggest that "Nil Desperandum" regards twelve months' waiting with equanimity.

With an apology for the length of the epistle,

Yours very sincerely,
G. H. BROWN-EKINS.

PROPELLERS.

To the Editor of FLIGHT.

SIR,—Answering Mr. H. G. Dawson's query in a recent issue, it must be stated that no figure for thrust per h.p. can be given unless the pitch and speed of rotation of the perfect propeller in question are known. This becomes clear when we consider that thrust is a force measured in lbs., whilst h.p. denotes a certain rate of doing work, and contains not only the factor of force, but those of distance and time as well.

Let us assume a perfect propeller having a pitch of P feet, and revolving at a speed of N revs. per minute. Let T be the thrust in lbs. and let V be the velocity of advance through the air in feet per minute (assuming the propeller to be driving an aeroplane).

Since the propeller is perfect, *i.e.*, of 100 per cent. efficiency, we have h.p. input = h.p. output (useful); but h.p. output $= \frac{T \times V}{33{,}000}$ (as 1-h.p. = 33,000 ft. lbs. per min.). As the slip is zero, we have $V = P \times N$; therefore h.p. input $= \frac{T P N}{33{,}000}$; or thrust per h.p. $= \frac{33{,}000}{P N}$.

This result indicates that for propellers of different diameters, but having the same speed and pitch, the thrust per h.p. is the same. For example, propellers of 3 ft. pitch, revolving at 1,200 r.p.m. would, if perfect, give a thrust per h.p. of $\frac{33{,}000}{3 \times 1{,}200} = 9{\cdot}2$ lbs.

Yours faithfully,
R. C. CLINKER.

To the Editor of FLIGHT.

SIR,—I reply to Mr. H. G. Dawson's letter in a recent issue. He inquires for the utmost thrust per horse-power for a perfect propeller. As I have been engaged in the manufacture of propellers for both marine and aerial work for upwards of fifteen years, I must tell him that, so far, there is no "perfect propeller."

I experimented with a 4-foot propeller some time ago, and got a thrust of 4 lbs. per square foot at 1,000 revolutions. Now taking this in relation to the lift it works out 12 to 1. However, Sir Hiram Maxim gives (I think it was a lecture at the Mechanical Institute) a propeller would give a thrust of 5 lbs. per square foot, which would still reduce the ratio.

In practical work I do not think there has been enough consideration given to the propellers. I do not mind making public the method I adopt. I leave the propeller to the last. After the model has been made, I find its weight. I then procure the weight of the different sized engines, say a 20-h.p., weight 112 lbs., components, including petrol tank with 4 gallons of spirits, 110 lbs. Now take the total weight of machine (allowing for pilot's weight and approximate weight of aluminium propeller), and calculate the area of the propeller, running at a specified speed, necessary to drive this weight through the air at 10 miles per hour. On making the propeller allow a margin of 10 per cent. or upwards. A machine when travelling decreases its weight at a square of its increased speed, so that the 10 per cent. marginal increase of area must be increased in proportion, not forgetting the utmost power that the engine will give at the necessary speed.

Trusting this will give Mr. Dawson and others an idea of the importance of the propeller's work, and wishing FLIGHT an ever increasing success,

I am, yours faithfully,
Chiswick. CECIL P. LEVERMORE.

"AVIATION."

To the Editor of FLIGHT.

As this word is now universally in use, and as it is not a dictionary word, it might be interesting to investigate its origin, and to know who may claim to have first employed it in connection with aerial locomotion. I believe I am the originator, and although the word is euphonious, I long since learnt that it is quite incorrect if intended to mean "flying." Properly speaking, "aviation" means "birding," "aviator" means "birder," "aviate" means "to bird."

I think it would be more correct if the Press and public generally would use the words "volitate," meaning to fly; "volitator," a person who flies; and "volitation," the act of flying.

The words are quite as euphonious, and, in fact, more so, especially when using the corresponding expressions as they should be in the French language, viz:—"*Voler*," to fly; "*volitateur*," a person who flies; "*volitation*," the act of flying.

Believe me, yours truly,
Aero Club. "GYROPTER."

AN IRISHMAN—AND BRITISHER.

To the Editor of FLIGHT.

SIR,—Is it not a fact that Mr. J. T. C. Moore-Brabazon is an Irishman, and if this is the case why not state it, at least in as prominent a place as the notice about him in your issue of November 6th, 1909? Not wishing to incur Editorial condemnation as a self-advertiser, I subscribe myself,

Yours faithfully,
IRISHMAN.

[Mr. Moore-Brabazon's Irish descent is so well-known that that must be our excuse for the obvious omission of the statement from our "history" last week. We can assure our correspondent, who, by the way, is a much esteemed motorist, that there was no intention on our part of doing an injustice to Ireland.—ED.]

To the Editor of FLIGHT.

SIR,—In the current number of FLIGHT you refer to Mr. Moore-Brabazon as "the first Englishman to fly in a heavier-than-air machine." Over here we call him an Irishman, and I think you will find we are right.

Yours faithfully,
Castlerea, co. Roscommon. MAURICE J. DODD.

A MODEL PETROL ENGINE.

To the Editor of FLIGHT.

SIR,—We notice in your issue of November 6th that one of your correspondents—Mr. H. Jerrard, Baker Street—is asking whether it is possible to obtain a petrol or steam engine to drive a 10-in. Cochrane propeller at about 1,200 r.p.m., weighing about 4 lbs.

We take the liberty of recommending our ¼-h.p. petrol engine, of which we give particulars below :—

Speed, 2,000 r.p.m. ; weight, 4¼ lbs. ; bore, 1½ in. ; stroke, 1½ in. ; air-cooled ; price, £5.

This engine is powerful enough to drive a 15-in. propeller at 2,000 r.p.m., and we think is just the thing your correspondent is looking for.

We shall be only too pleased to give him or anyone else particulars this and also more powerful engines.

We are, Sir, yours obediently,

THE AUTOMOBILE AND AERIAL SUPPLY CO.

Norwich Union Buildings, St. James' Street, W.

THE "RIGHTING" EFFECT OF THE DIHEDRAL ANGLE.

To the Editor of FLIGHT.

SIR,—The self-righting properties of a monoplane constructed with a dihedral angle is, judging from two of your last week's correspondents, rather difficult to comprehend. Perhaps the easiest way to understand is to make a small model of wood with a lead keel, and float the same in water; its self-righting properties at once become evident (provided the keel has sufficient weight).

Taking Mr. Kemp's second figure, as long as the speed remains constant, the two pressures, P and P¹, at right angles to the two wings, remain constant (*i.e.*, if there is no lateral movement of the air) for *any* tilt the machine might take, and so may be left out of consideration. But when the aeroplane tilts, the supporting surface, which is proportional to the projected area of the two wings on to the horizontal, becomes less, and not only less, but unbalanced, *i.e.*, on either side of the point O the right wing becoming its maximum and the left smaller. Now, since the supporting surface has become less, the monoplane tends to fall ; now the pressure of air upwards on the right wing (of air due to the downward motion) is greater than that on the left (in proportion to the horizontal projections), and so with the weight, W, their difference, *i.e.*, between the pressure on the left and right wings, makes a couple which tends to right the machine.

To make this even more plain, lessen the angle, a, to 90°, then that the dihedral angle helps to balance the "Antoinette" monoplane becomes an axiom.

Yours truly,

Rugby. R. D. PARRY.

MODELS IN THE MAKING.

To the Editor of FLIGHT.

SIR,—Having completed a model of a Wright biplane (except for the engine), I am desirous of constructing a monoplane, and should be very grateful if you would answer me the following questions :—

1. Which do you consider the best type of monoplane for models, Bleriot or Antoinette?

2. About what span of wings would be the best size to attempt (taking into consideration the power of small engines)?

3. What kind of wood would be best to use and where can it be obtained ?

4. What is the best aerocloth, in your opinion, for models ? I have used varnished silk on my previous model.

5. Do you know of any house supplying rubber-tyred wheels for model aeroplanes ?

6. With reference to question No. 1, do you propose shortly to give machine drawings of the Antoinette ?

I may add that FLIGHT, of which I have been an interested reader from the first number, has helped me very considerably in building my previous model, and I sincerely wish you every success.

Yours faithfully,

Huddersfield. VIVIAN B. LEAROYD.

[(1) The Bleriot and the Antoinette would be equally suitable for copying. (2) The power required to drive a small model would be in proportion to a certain index of the weight ; exact calculations are not simple, reference to Lanchester's work on "Aerial Flight" should be made for a study of the question. (3) We would suggest ash for all curved members, and elsewhere spruce ; a local carpenter should be pleased to execute the order. (4) For small work varnished silk is doubtless a useful covering, but the aero cloth manufacturers advertising in FLIGHT will send particulars of light rubber-proofed fabric suitable for this work. (5) We suggest writing to perambulator manufacturers for small rubber-tyred wheels. (6) This was given in recent issues of FLIGHT.—ED.]

MR. J. T. C. MOORE-BRABAZON, when he won the £1,000 prize for a mile circular flight on a Short biplane, we learn from the Bowring Petroleum Co., Ltd., used Mex motor spirit.

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NEW COMPANY REGISTERED.

Empress Motor Car and Aviation Co., Ltd.—Capital £15,000, in £1 shares (5,000 6 per cent. cumulative preference). Formed to acquire the business carried on by W. D. Forsdike at 180, Stockport Road, Manchester, as the Empress Motor Co.

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Aeronautical Patents Published.

Applied for in 1908

Published November 18th, 1909.

22,209. W. MARK. Raising, lowering and propelling airships and flying machines.

22,238. J. E. HUMPHREYS. Aeroplanes.

Published November 18th, 1909.

23,104. J. L. GARSED. Aerial machines.

23,208. F. W. T. TAYLOR. Aerial machines.

Applied for in 1909.

Published November 11th, 1909

3,058. E. D. PARROTT. Dirigible balloons.

9,608. J. MEANS. Apparatus for launching flying machines.

9,611. J. MEANS. Devices for launching flying machines.

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